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ABSTRACT

Few school leaders and school architects have recognized or comprehended the potential symbiosis between school site resources and the enrichment of the instructional program, the urgency of repairing and improving the biosphere, the broadening of community life onto school sites, and the recognition of the responsibility role of stewardship of public lands. Accordingly, the authors present 21 site planning concepts that can be the basis for public site policy formulation. The concepts are divided into three sections: economics, environment, and educational outcomes of school site planning. The sections each contain seven planning concepts that utilize research and case studies. The section on economics discusses public tax expenditures for school land as investments not costs and claims that because people value school park sites with natural landscape features, this stabilizes or increases neighborhood property values. The environment section discusses land use, microclimate enhancement, biosphere improvement, unit of design, land form scale modeling, water resources, and esthetics. The section on educational outcomes of school site planning presents guidelines for school-community land resources and discusses outdoor classrooms on school sites, and children's play environments designed for optimal potential growth. (Author/MLF)

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ECONOMICS / ENVIRONMENT / EDUCATIONAL OUTCOMES OF SITE PLANNING

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The purpose of education will be better achieved when public policy reflects the tenet that WHAT HAPPENS TO LAND HAPPENS TO PEOPLE

by

KARL W. GRUBE

&

MARY BEWLEY

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ECONOMICS / ENVIRONMENT / EDUCATIONAL OUTCOMES OF SITE PLANNING

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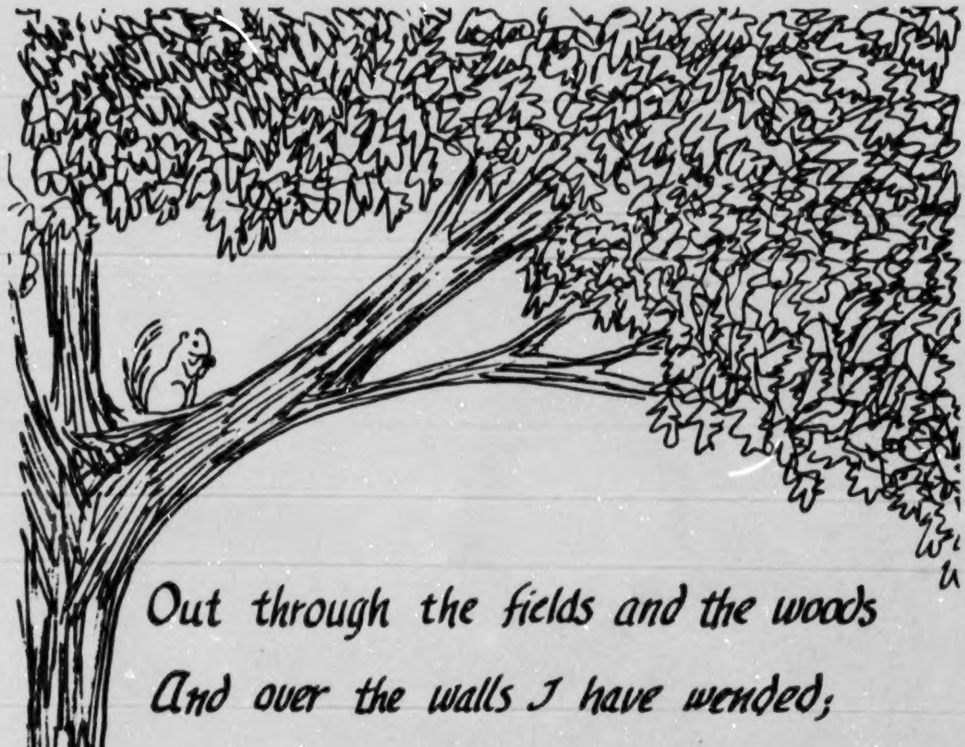

Out through the fields and the woods
And over the walls I have wended;
I have climbed the hills of view
And looked at the world, and descended;
I have come by the highway home,
And lo, it is ended.

Robert Frost

Russell E. Wilson

1917 - 1974

In Memoriam

RUSSELL E. WILSON

1917–1974

REMEMBERING RUSSELL E. WILSON

Frederick W. Bertolaet, Acting Dean
School of Education

Sister Eileen Rice, Director
St. Joseph Academy

Paul L. Anderson, Student
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Dr. Wilson, of 9250 Fleming Road, Dexter, who was born in Wayland, joined The University of Michigan Faculty in 1957. The former consultant with The University of Michigan Bureau of School Services served on the Michigan Department of Education Advisory Council until 1972.

The teacher was involved in environmental education for the Ann Arbor public schools and was chairman of the committee on school sites for the district from 1969 to 1971. He was writing a book about "Environmental Education on School Sites."

Dr. Wilson received his bachelor's degree in 1939, master's degree in 1947 and doctorate in 1955, all from The University of Michigan.

Dr. Wilson taught in the Ann Arbor public schools from 1939 to 1940, was a department head at Henry Ford School in Dearborn from 1940 to 1942 and was an assistant professor in naval subjects in 1945 at Cornell University.

Dr. Wilson was a veteran of the United States Navy, serving during World War II.

He was a graduate assistant and lecturer at The University of Michigan from 1945 to 1948 and director of school site planning and information for the Dearborn Public Schools from 1948 to 1951.

Dr. Wilson was assistant to the superintendent in the Dearborn Public Schools from 1951 to 1953 and was an educational consultant for Brunswick Balke Collender in Chicago from 1953 to 1956.

Dr. Wilson invented stackable plastic chairs used in schools.

He also was author of the Equal Quality Plan, a proposal to make financing of education more equitable throughout the state.

Dr. Wilson is survived by his wife, June, four daughters, Mrs. Jerry (Doranne) Jacobson of Khandera, India; Mrs. Jacqueline Bowden of Oakland, California; Mrs. William (Pamela) Sartorelli of Boston, Massachusetts, and Wendy Wilson of Ann Arbor; a sister, Mrs. Joseph (Vivian) Steffes of Grand Rapids; one granddaughter, Laurie Jacobson of India; and several nieces and nephews. Dr. Wilson was preceded in death by his daughter, Patricia.

Cremation has taken place. Memorial contributions may be made to the Russell E. Wilson Memorial Fund by sending checks to Dean Frederick W. Bertolaet, University of Michigan School of Education.

ECONOMICS / ENVIRONMENT / EDUCATIONAL OUTCOMES OF SITE PLANNING

There must be active and broad recognition of man's dependence upon, and man's heritage from, the soil fabric of the world. There must be an enlightened review and resolution of the conflicting and dichotomous values within our society regarding resources and regarding the role of the schools as cultural agencies assigned to bolster these values. And not the least of our nation's neglected and unrecognized resources are the school sites which occur in every hamlet and city across the countryside.

The uneasiness of most of our people is focused on the question, "What is happening to our water?" For man in his life activity demands is never further away in time than one-half day from the need to quench his thirst. Yet one group of decision-makers seeks to fine "high and dry" school sites; failing that they drain and fill the sites they do purchase and lose the water to the sea, draining this bloodstream from the life cycle of men and plants and all of the land-based biosphere.

Conversely, the meeker-voice policy makers cry out urging school men to save the water and to reuse it and to recycle it by replenishing the underground sources of our wellsprings. Which of these value systems is to prevail in our times and in our nation?

Also, the arm of society called schools has been assigned a task to preserve and reproduce our American heritage. Further, it is given to the younger groups in our population to carry big plans in society forward and up. To aid them, schools are built on school sites, and these aids to learning then are placed in the hands of the educators.

In recent decades, school leaders and school architects have learned competently to weld together instruction programs and school buildings into highly functional entities. But only a microscopic few of these have recognized or comprehended the potential symbiosis between school site resources and the enrichment of the instructional program, the urgency of repairing and improving the biosphere, the broadening of community life onto school sites, and the recognition of the responsibility role of stewardship of public lands.

Accordingly, the authors present twenty-one (21) site planning concepts which can be the basis for public site policy formulation. The site planning concepts are divided into three distinct categories: Economics, Environment, and Educational Outcomes of School Site Planning.

ECONOMICS OF SCHOOL SITE PLANNING

1. PUBLIC TAX EXPENDITURES
'Community land resources' are investments not costs

2. MUNICIPAL OVERBURDEN
'Open space sites' reduce government service costs

3. THE RIPPLE EFFECT
Influences home buyer/seller attitudes

4. MULTI-AGENCY CONTRACTS
Results in substantial dollar savings

5. SCHOOL-PARK SITES
Stabilizes neighborhood property value

6. MASTER SITE PLANNING
Renovated sites are self-liquidating projects

7. NATURAL LANDSCAPE FEATURES
Creates additional property tax revenue

ECONOMICS

SITE DESIGN CONCEPT 1

Public Tax Expenditures: community land resources are investments not costs

1.1 Definition: Capital improvement funds for developing public school sites into community land resources are dollar expenditures recoverable within a generation. These tax expenditures enhance the quality of neighborhood environs and markedly improve the educational potential of public school sites. The economic market result is a significantly expanded neighborhood property tax base which yields additional property tax revenue.

1.2 Selected Application:

"Cost: the loss or penalty incurred in gaining something."

"Investment: the outlay of money for income or profit."

Boards of education tend to regard public tax revenues appropriated for school site development as costs--monies which are literally lost through the construction of site facilities and/or improvements. Research on school site development expenditures at The University of Michigan does not substantiate this point of view. The data indicates that dollar revenues spent for site development contribute significantly to the appreciation of the market value of surrounding land. This appreciation rate recapitalizes the site development investment within a twenty-year period. Thus, public tax revenues used to develop school sites into community-oriented land resources need to be viewed as investments not costs.

Two of The University of Michigan studies analyzed market sales housing data, school building and site data, and neighborhood profile characteristics. Four economic concepts clearly emerged:

1. The combination of educational community and landscape developed acreage, natural or manmade amenities, good site development practices, good site design, and good site maintenance are influential in contributing to higher market sale prices of residential housing units surrounding public school sites.
2. Enlargement and conversion of small, limited-space school sites into the site criteria standards of large, open-space school sites increases the market sales prices dramatically.
3. When developed parkland was the major portion of an elementary school site, these parklands influence positively the market sale prices of nearby residential housing.
4. The projected property tax revenue yields from residential housing units surrounding large, open-space well-developed school sites are sufficient to pay the additional investment for open space acreage, site development and site maintenance when collected over a twenty-year period.

This urban/suburban sample represents three Michigan school districts: Ann Arbor, Lansing and Dearborn; however, similar results have been documented in Flint, Michigan; Kearney, Nebraska; Dallas, Texas; Fort Worth, Texas; and Milwaukee, Wisconsin.

A negative economic effect of underdevelopment also emerges. Small acreage school sites which are primarily surface with "low maintenance" asphalt playgrounds actually reduce the market value of neighboring residential properties by as much as 20%. Extensive applications of asphalt on school sites should, therefore, be viewed by educational planners as costs rather than investments.

1.3 Case example: A 1973 study at The University of Michigan entitled, "The Economic Influences of Elementary School Sites on Residential Property Tax Revenue in Selected Urban Neighborhoods", measured the economic impact of urban elementary school sites and buildings on the surrounding residential property tax base.

Matched pairs of elementary school site neighborhoods were selected in the school districts of Dearborn and Lansing, Michigan. Market sale price histories of the subject population (1,224) were obtained for single-family residential housing units for five, large open space school site neighborhoods and for five comparable, small, limited space elementary school site neighborhoods. Pertinent market sales data, building and site data and neighborhood profile data for the period of 1952 through 1971 were collected and statistically analyzed.

The data indicated that the market sales of residential housing surrounding large, open space elementary school sites were increasing at significantly greater rates than were the market sales prices of similar housing surrounding small, limited space elementary school sites. Annual market sale prices of housing surrounding the larger sites were found to be increasing at dollar value rates which ranged from $433.- to $806.- per house as contrasted to appreciation rates of $168.- to $804.- for similar housing surrounding the smaller sites. When the dollar value increase for residential housing were transformed into percentage yields per year, the housing surrounding the larger sites indicated appreciation rates ranging from 3.76% to 5.01%. In contrast, the percentage increases were significantly lower for similar housing associated with smaller sites, which ranged from 1.77% to 4.69%.

In 1958, the average selling price for all residences surrounding large, open space elementary school sites were $13,535, slightly greater in dollar value than the average selling price for similar housing associated with small, limited space elementary school sites, $13,510. By 1965, housing surrounding the larger sites had risen to an average marked price of $17,082 as contrasted to similar housing located around smaller sites which reflected an average sales price of $16,602. Table 5-1 and Figure 5-1 depict the summary results for all sales records of residential housing around both large, open space and small, limited space elementary school sites.

ECONOMICS

SITE DESIGN CONCEPT 2

Municipal Overburden: 'Open Space Sites' reduce government service costs

2.1 Definition: Municipal tax expenditures for essential city services are directly related to the acreage size of public school sites. As the acreage size of public school sites is increased from one city block (4 acres) to three city blocks (15 acres), two blocks of city streets are eliminated. The elimination of these roadways results in substantial reduction of municipal overburden expenditures through decreased capital outlay for municipal services.

2.2 Selected Application: A four acre neighborhood school site located on one city block requires approximately 600 lineal feet of municipal roadway not required by a 15 acre school park site encompassing three city blocks.

MUNICIPAL OVERBURDEN ENGINEERING COST ANALYSIS CATEGORIES

COST FACTOR	UNIT PRICE		NUMBER OF UNITS NEEDED		SERVICE AREA TOTAL		MILES OF STREET		COST PER MILE
I. INSTALLATION OF STREETS									
Cost of right-of-way	____	x	____	=	____		____		____
Cost of engineering	____	x	____	=	____				
Cost of legal work	____	x	____	=	____				
Cost of roadway concrete	____	x	____	=	____				
Cost of labor	____	x	____	=	____				
Cost of curbing	____	x	____	=	____				
Cost of gutter	____	x	____	=	____				
Cost of equipment	____	x	____	=	____				
Cost of fuel	____	x	____	=	____				
Cost of insurance	____	x	____	=	____				
TOTAL COST OF INSTALLING STREETS					$ ____	÷	____	=	$ ____

This additional lineal footage increases municipal costs for roadways, water/sewer, lighting, police/fire protection, sidewalks and related municipal services. The degree of overburden expenditure can be estimated by examining selected engineering cost factors involved in the construction and/or maintenance of city roadways. Cost analysis of six engineering categories yields a reliable work dollar figure.

2.3 Case Example: The Park-School Urban Redevelopment Project in Flint, Michigan, has reduced the municipal expenditures for city roadway maintenance services through a cooperative park/school/city agreement. This city-wide agreement allows for the closing of nonessential city streets which lie between school property boundaries and adjacent parklands. The school site and the parkland are developed into a common land/facility complex by utilizing redevelopment funds on a cost sharing formula.

Recently 900 lineal feet of roadway between William Elementary School and the Whaley Park was closed off to form a contiguous neighborhood Park/School land unit. Cost savings to the City of Flint through the elimination of municipal maintenance services for the 900 lineal feet of roadway resulted in an annual savings of $ 675 with a projected cost savings of $ 8977 over the next decade.

This 72 acre urban redeveloped community park school complex services a highly densified residential neighborhood with programs in education, recreation and community development. Not only has municipal overburden expenditures for roadway maintenance been reduced, but this 'common land' has become a catalytic agent creating a new sense of pride within the neighborhood, as evidence by higher market values for residential housing, appreciated property tax revenue collections, and reduced rates of vandalism within Whaley Park. The initial Flint Park School Redevelopment Projects have been expanded to encompass all existing school and park sites within the school district.

ECONOMICS

SITE DESIGN CONCEPT 3

The Ripple Effect: influence home buyer/seller attitudes

3.1 Definition: The ripple effect of 'principal of unearned land rent' refers to the increased dollar appreciation to adjacent land parcels which occurs when certain types of buildings and site amenities are found in compatible combination. Depending upon the degree of site development, public school sites have either a positive or negative impact upon (1) surrounding property tax base (2) the market value of residential housing and/or (3) the residential housing turnover (market mobility) of residential neighborhoods. All public school sites affect neighborhood property values as far away as five street crossings from the school building.

3.2 Selected Application: Land developers of real estate properties have understood that land units which have site amenities such as water, large shade trees, vista view, and terraine variation have higher market values than similar land units without these site amenities. Research evidence indicates that real estate values for parcels surrounding man-developed land units also significantly appreciate. These real properties are then carried on the public tax rolls at the higher market value figure; thus, everytime a school millage issue is passed--the school district receives additional bonus property tax revenue as a direct result of the man-developed land unit.

Major research studies at The University of Michigan, University of Wisconsin, and Texas Technical College pertaining to the economic impact that green island school/park sites have upon the surrounding neighborhood property values and their resultant property tax assessments indicates that this type of school land resource is a positive tax revenue asset to the community. Further, well-selected, planned, and developed school sites positively affect the market value of residential homes and the property tax base five or more street crossings from the school site. The net effect is sufficient to allow the school district to recapitalize their initial investment for land acquisition, development and maintenance within a thirty year cycle of property tax collections.

The table below summarizes the ripple effect in selected cities in three states. The data bank for eight American cities consisted of 48 elementary schools, 12 to 30 acre school/park sites, 12,000 residential housing units, 2,500,000+ pieces of housing data, neighborhood profile data, site and educational facility data. Each of the elementary school/park samples had 250 residential units which constituted the bases for revenue calculations.

"UNEARNED LAND RENT/RIPPLE EFFECT" of PUBLIC SCHOOL SITE DEVELOPMENT

Sites and City	$Bonus Revenue/House	Annual Revenue	30-Yr. Revenue	8% Invested Revenue
(4) Lansing, MI	$ 7.00	$ 1,750,00	$ 52,500,00	$ 460,000.00
(4) Dallas, Texas	12,00	3,000,00	90,000,00	720,000.00
(4) Fort Worth	18,00	4,500,00	135,000.00	1,080,000.00
(14) Flint, MI	21,00	5,250,00	156,500,00	1,248,000.00
(6) Dearborn, MI	24,00	6,000,00	180,000,00	1,540,000.00
(4) Grand Rapids, MI	32,00	8,000,00	240,000,00	1,820,000,00
(6) Milwaukee, Wis.	48,00	12,000,00	360,000.00	2,880,000,00
(6) Ann Arbor, MI	52.00	13,000.00	390,000.00	3,112,000.00

3.3 Case Example: The Burns Park School of Ann Arbor, Michigan, is located on a fifteen acre school park developed site. Its neighborhood is residential in character and has as users a variety of age groups. The school/park site has a senior citizens facility, individualized creative playground environs, a multi-use shelter facility, tennis courts, a wading pool for small youngsters, an ice skating/athletic field combination facility, a hill which is used in the winter for sledding and in fair weather for observation points and "king of the mountain gaming" and a pedestrian walkway/bicycle path system which is designed to create areas of solitude and quietness for all residents of the neighborhood. The site is used on a twelve-month basis and homeowners pay premium prices for housing in order to be located near this green island school/park site.

The residential housing of the neighborhood is carried on the public tax rolls at higher figures because of the developed community land resource. In fact, many of the homes purchased in this neighborhood actually cost the home buyer more money than their replacement costs. Assessed property valuations creates a $52.00 per year in bonus property tax collections per housing unit for the City of Ann Arbor when these homes are compared to similar homes in other areas of the city. Thus, these premium tax collections resulting from the Burns Park Neighborhood Development have been sufficient to self-liquidate the entire site development project over a thirty year amorization schedule.

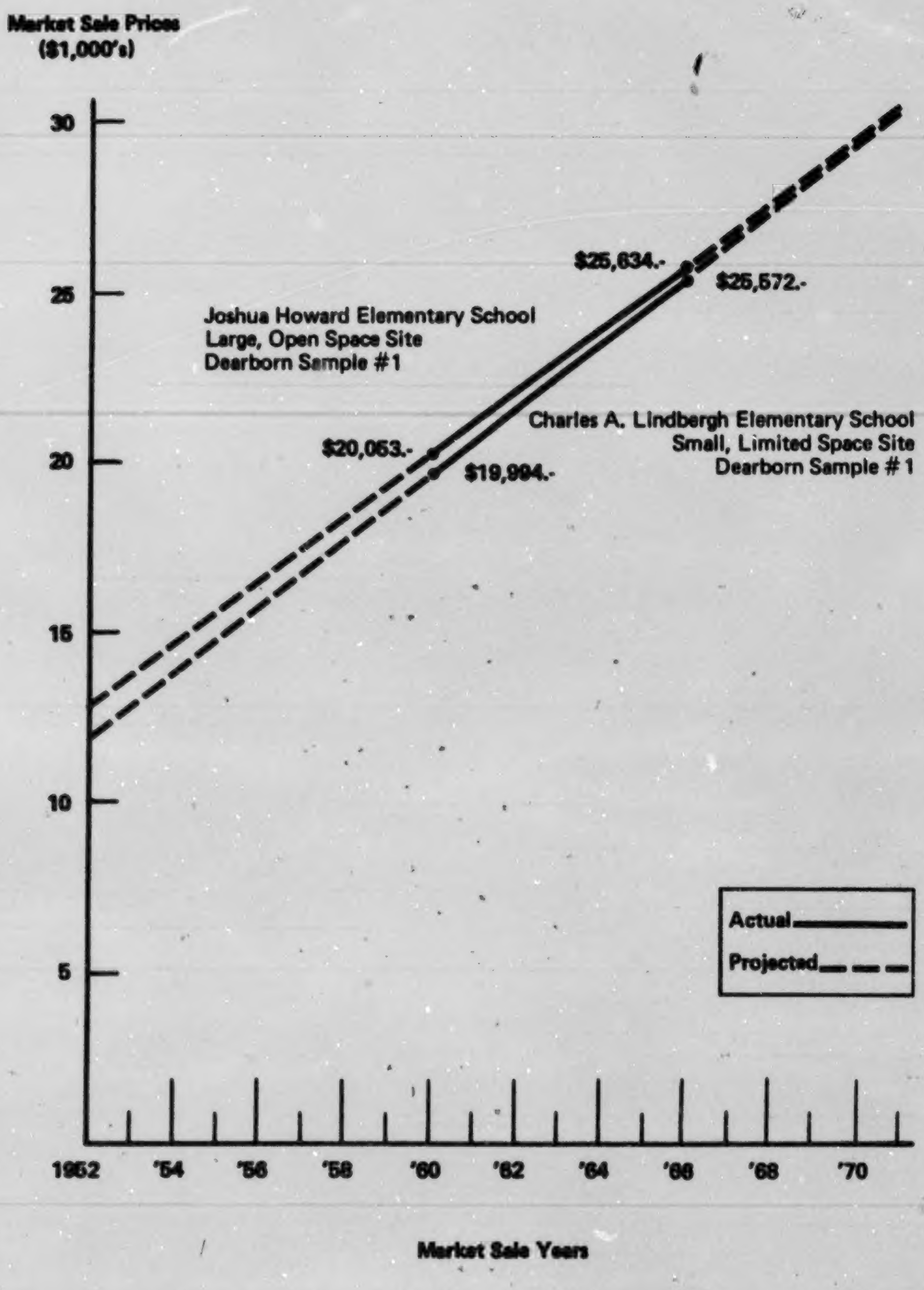


FIGURE 4-1 GRAPH SHOWING THE MEANS ($\overline{X}$'S) FOR THE LAST SALE PRICE AND THE FIRST SALE PRICE IN DOLLARS AND THE LAST SALE YEAR AND THE FIRST SALE YEAR FOR RESIDENTIAL HOUSING UNITS SOLD AND RESOLD IN THE SUBJECT NEIGHBORHOODS BETWEEN THE YEARS OF 1952 THROUGH 1971.

ECONOMICS

SITE DESIGN CONCEPT 4

Multi-Agency Contracts: results in substantial dollar savings

4.1 Definition: The signing of contractual agreements by boards of education with local, state or federal governmental agencies to plan, purchase, develop or maintain public school sites results in substantial dollar savings.

4.2 Selected Application: Various government agencies own parcels of land within the school district boundaries which can be utilized for educational/recreational/community programs.

Federal and state governments have legal title to thousands of property tax reverted acreage ranging in size from small city lots to township size tracts. These extensive land holdings have led to the formation of special land management divisions of government with three distinct purposes: (1) reorganize these lands by selling to private developers thus increasing local property tax revenue (2) developing these land parcels for city and state parklands and (3) transferring these lands into state and national forest preserve systems. In 1972, a Presidential Executive Order directed federal governmental agencies to fully cooperate with local authorities in the orderly transfer of federally owned lands to local units of government.

Accordingly, the board of education in West Bloomfield, Michigan effectively applied the 'trading stock' concept to substantially reduce the initial capital investment for a senior high school site. Following a school district wide site survey, the property owner of the first choice site had inflated the selling price significantly above existing market value. The school officials purchased their second choice site from the State of Michigan. When the property owner discovered that the board of education had purchased another site, he substantially reduced his asking price. The board of education accepted his offer and resold the second choice site at profit. Application of the 'trading stock' concept enabled the West Bloomfield School District to acquire the highest priority site at a net fiscal savings to local taxpayers.

In order to maximize the potential of identifying and utilizing lands owned by other governmental units, school district officials should authorize a public land study which results in the establishment of a land profile data bank. The research should include but not be limited to the following criteria:

CRITERIA FOR A SCHOOL DISTRICT LAND PROFILE DATA BANK

LAND USE

School District Wide Land Inventory

include the amount, distribution, and quality of land owned by other governmental units and data relative to ownership

Impact Upon Zoning

includes immediate and long-range changes in land use patterns resultant from acquisition of future school sites

LEGAL AUTHORITY

Board of Education Authority

includes the legal powers in relation to residential subdivision development to ensure quality school sites and educational facilities

State Legal Responsibility

includes the legal powers in regard to land development entrusted to state government including the State Attorney General's Offices

ECONOMIC IMPACT

Economic Land Development

includes land held by boards of education relating to property tax base, resale and holding for lease/rental

Market Value of Residential Property

includes fiscal impact of well-developed school sites and/or newly acquired lands upon surrounding residential real estate values

ECONOMIC AND LEGAL ASPECTS

Land Transactions

includes economic and legal considerations of administrative and financial procedures for implementing land transfers

Public Agency Policies

includes current land ownership practices of municipal, township, county, state and federal agencies within the school district boundaries

4.3 Case Example: In the city of Flint, Michigan, a 14 acre park-school site development project is nearing completion through a multi-agency contract between the city's Board of Education, Park and Recreation Board and Mott Foundation. For years much of this land was undeveloped and unused. All of the land is owned by the Park and Recreation Board and Board of Education. The land is located in densified residential neighborhoods where large numbers of children and adults can benefit from enlarged outdoor recreation and community facilities.

The project originated in 1964 with the formation of a joint Park-School Site committee consisting of representatives from the city's Park and Recreation Board, Board of Education and Mott Foundation. There has been three basic development stages for the site projects: (1) Planning and Engineering (2) Major Construction and

(3) Landscaping and Completion,

The Gundry-Hasselbring Park-School Site was funded with $88,000 from the Flint Recreation and Park Board, $22,100 from the Flint Board of Education and $11,700 from the Gundry Elementary School Community Council. The site provides tennis courts, handball and tennis practice areas, picnic area, ice skating rink, multiple play areas, baseball diamond, elementary playground, shelter and parking.

The Jefferson-Oak Knoll Park School was financed with the Flint Park and Recreation Board contributing $144,735, Flint Board of Education allocating $41,748 and Jefferson Elementary School Community Council raising $12,876. The site includes lighted areas for field games, outdoor classroom, picnic area, winter coasting, picnic pavilion, shuffle board, tennis courts, wet weather area, park headquarters and two large parking areas.

Currently the Flint Recreation and Park Board through the City Commission now budgets regularly for this site development program and the Mott Foundation matches Board of Education allocations. The multi-agency contracts have been expanded to other school sites in the city of Flint and include funding from federal revenue sharing, federal Bureau of Outdoor Recreation--Land and Water Conservation Fund, Michigan Park and Recreation Bond Fund.

ECONOMICS

SITE DESIGN CONCEPT 5

School Park Sites: stabilize neighborhood property values

5.1 Definition: A fifteen acre neighborhood school park site will positively affect the market sale prices of surrounding residential real estate. Higher property tax revenue collections result from the major land portion of the site being dedicated to landscaped parkland and the entire site developed to maximize educational/ recreation/community usage.

5.2 Selected Application: Historically, a focal point of well-established neighborhoods has been the public school site. It was the public school and its site which provided a common facility and land resource for potentially satisfying neighborhood experiences. Most public school systems in America given limited consideration to the ways in which the school site, 'the only common land for youth in a neighborhood', can be used to enhance the environmental quality of neighborhoods. The public school site is located to serve a residential population with limited amount of public or private transportation required. While many neighborhoods do not have public land set aside for use as parkland or commons, the public school site is available to all residents of the neighborhood.

The development of a public school site into open space school park standards increases the quality of life within the neighborhood and confronts a major educational problem. The national problem involves the reduced effectiveness of educational programs resulting from high turnover of enrollments (neighborhood mobility) within the schools.

School park sites exert a positive influence upon the market sale prices of nearby residential housing; thus lowering the market sale/resale ratio of housing turnover of the neighborhood. This stabilizing effect exerted by the school park site reduces the

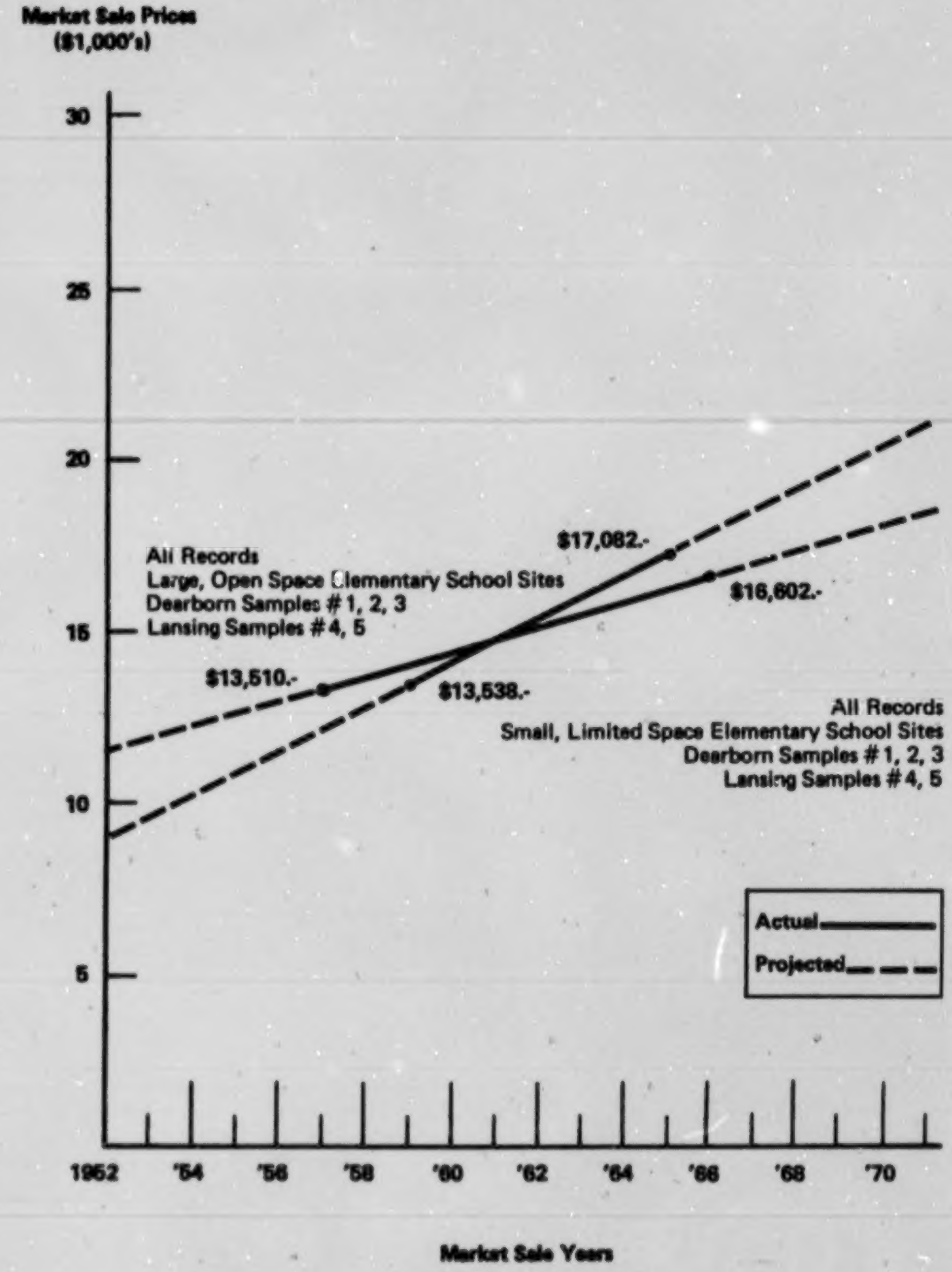


FIGURE 5-1 GRAPH SHOWING THE MEANS ($\overline{X}$'S) FOR THE LAST SALE PRICE AND THE FIRST SALE PRICE IN DOLLARS AND THE LAST SALE YEAR AND THE FIRST SALE YEAR FOR RESIDENTIAL HOUSING UNITS SOLD AND RESOLD IN THE SUBJECT NEIGHBORHOODS BETWEEN THE YEARS OF 1952 THROUGH 1971.

enrollment turnover within the school; directly improving the quality of the education program.

5.3 Case Example: The stabilization effect of school park sites upon the market value of residential family dwelling was documented by Dr. Karl W. Grube of The University of Michigan. Research was conducted in seventy-five school districts in the state of Michigan which substantiated previous efforts in the cities of Milwaukee, Wisconsin; Dallas and Fort Worth, Texas.

Specifically, matched pairs of elementary school site neighborhoods were selected in the school districts of Dearborn and Lansing, Michigan. Market sale prices histories of the subject population, 1224 (one thousand two hundred twenty-four) were obtained for single-family residential housing units for five school park elementary site neighborhoods and for five, comparable, small, limited space elementary school site neighborhoods. Pertinent market sales data, building and site data, and neighborhood profile data which occurred during the period of 1952 through 1971 were collected and statistically analyzed. Based upon the statistical analyses of the data, the following conclusions were reached:

1. The combination of: educational community, and landscape developed acreage; natural or manmade amenities; good site development practices; good site design; and, site maintenance, were influential in contributing to higher market sales prices of residential housing surrounding the subject elementary school sites.

2. The enlargement and conversion of a formerly small, limited space elementary school site into the site criteria standards of a large, open space elementary school site increased the market sales prices dramatically; thus, the most recent market sale prices in the neighborhood equaled those recorded around the comparable, large, open space elementary school site.

3. When developed parkland was the major portion of an elementary school site, these parklands influenced positively the market sale prices of nearby residential housing.

4. The projected property tax revenue yields from residential housing units surrounding large, open space elementary school sites can be sufficient to pay the additional investment for open space acreage, site development, and site maintenance when collected over a thirty-year period.

ECONOMICS

SITE DESIGN CONCEPT 6

Master Site Planning: renovated sites are self-liquidating projects

6.1 Definition: The enlargement and renovation of small, limited space school sites into optimally developed land resources for neighborhood residents creates the economic free market conditions for recapitalization of initial capital expenditures for newly acquired land, master site planning costs and site development expenditures.

6.2 Selected Application: Higher market sale prices for residential real estate are paid by willing buyers as a direct result of the capital investment decisions of school officials for the renovation of older public school sites. These investment monies contribute to the market appreciation of surrounding residential housing and land values within well-established neighborhoods. The increased residential housing values translate into higher property tax assessments which yield additional property tax revenue for public school districts and related governmental units. The additional property tax collections from the appreciated residential housing units are sufficient to recapitalize the school districts capital land improvement expenditures including additional site acquisition, master site planning expenses, site development costs, and site maintenance expenditures as collected over a thirty year amorization schedule.

Even small asphalt elementary school sites (2.5 acres) can be renovated through landscape architectural design techniques to favorably influence the surrounding residential property tax base. At the McDonald Elementary School, Dearborn, Michigan, site development expenditures have been allocated to include formalized landscaping which has contributed to the aesthetic beautification of this small urban site. The net fiscal result has been a stabilizing effect upon the market values' of surrounding residential real estate. This aesthetic treatment of this site with natural greenry has contributed to: (1) higher property tax collections ($7.00 per house per year), (2) lower neighborhood housing turnover (sale-resale), (3) increased property tax base, (4) recapitalization of the initial investment monies for landscaping within seven (7) fiscal years.

6.3 Case Example: The Charles A. Lindbergh Elementary School, a small, limited space school site is located in the northwest section of the school district of Dearborn, Michigan. The site, rectangular in shape and 6.3 acres in size, was purchased in 1928. Originally, the site consisted of 3.5 acres. Later in 1957, the closing off of a street and the moving at board of education expense of 12 residential homes to vacant lots in the neighborhood, brought the site to its present size. The site has attractive landscaping around the building, shade trees line the site perimeter, tennis courts, standard play equipment and a baseball diamond.

The twenty year mean market sale price appreciation rate for residential housing indicated a 4.69 per cent annual yield per house.

This figure exceeds the percentage mean appreciation rate of 4.64 per cent for identical residential housing surrounding the Joshua Howard Elementary Park School Site, (14 acres--open space site). Further, the Lindbergh Elementary School neighborhood residential housing was increasing at a mean annual dollar rate of $936 per house as contrasted to a mean annual dollar rate of $930 per house for similar housing surrounding the Joshua Howard Elementary School Site.

The regression lines for the two subject school site neighborhoods merge between 1967-68 with the Lindbergh Elementary School residential housing asserting slightly higher market sale prices thereafter. The Lindbergh Elementary School residential housing mean sale price increased $5,628 over a seven year period, 1960 through 1966, whereas the same time span indicated a $5,581 mean sale price increase for similar residential housing surrounding the Joshua Howard Elementary School Site.

The graphic results of the regression lines indicate a unique market phenomenon. Accordingly, these nearly identical regression lines are indicative of similar market functions for sale price levels of residential housing in both subject neighborhoods.

Of significant consequence was the expansion of the Lindbergh Elementary School Site from 3.5 acres to 6.3 acres with public tax revenues being provided for site development. This 1957 site expansion in unison with site development expenditures has positively influenced the market price trends. The initial capital investment for the site acquisition, site development, and site maintenance will recapitalize by 1977.

A corollary phenomena is emerging on public school sites which are developed into community land resources; school vandalism is significantly reduced. Preliminary cost data from Flint, Michigan, indicates that:

1. Community Park School Sites have the highest degree of site utilization by neighborhood residents when compared to traditional school sites and other parklands within the city.
2. Community Park School Sites have the lowest vandalism incidence rate of any type of park site within the city.

ECONOMICS

SITE DESIGN CONCEPT 7

Natural Landscape Features: creates additional property tax revenue

7.1 Definition: School sites which possess natural landscape features such as water resources, variety of vegetation zones, significant coniferous/deciduous trees, terraine variation, microhabitats for wildlife propagation are environmental land resources which contribute to an expanded property tax revenue base. These land resources are instrumental in appreciating the market value of surrounding residential real estate to the extent that additional property tax revenues are collected for public school districts and related ad valorum tax supported units of government.

7.2 Selected Application: School site development research at The University of Michigan indicates that natural landscape features in combination with water reservoir holding ponds on school sites can increase adjacent property values by as much as twenty (20%) per cent, thus increasing property tax revenue derived from school district millage levies.

The development of a water reservoir holding pond through the technical assistance provided by the United States Soil Conservation

Service can have both educational and recreational benefits for a community. For instance, water reservoir holding ponds can be used for year-round recreation (fishing, swimming, ice skating activities); can provide excellent outdoor classroom settings for students interested in environmental education and can be designed to capture rooftop and grassland run-off water thus reducing municipal water treatment expenditures associated with less gallons of school site water to be treated.

Further, the excavated soil from a six (6) acre pond site can be used to construct a large recreation hill on the school site. The U.S. Soil Conservation Service estimates that the amount of soil excavated from a six (6) acre pond site approximates 30,000 cubic yards. The use of this soil for constructing a recreation hill, 20' high, 100' wide, and 400' long will use 20,000 cubic yards. The recreation hill is large enough to be used for snow skiing instruction, active gaming by students and acts as a focal benchmark for drawing students away from the school building during non-school hours. The remaining 10,000 cubic yards of soil can be used for filling low areas of athletic fields; used for filling low levels of nature trails; and for stock-piling of top soil for use at future landscaping at other school sites. The following diagrams illustrate pond site/recreation hill specifications:

7.3 Case Example: The Thurston Elementary School in Ann Arbor, Michigan, was constructed in 1961 in conjunction with the Orchard Hills/Bromley Subdivision Land Development. The twenty-four acre open space school site forms the focal point of the subdivision. An unusual man-made land resource of the site is a ten (10) acre swamp/bog habitat located at the north end of the site.

Through the joint cooperative efforts of school officials from the Ann Arbor School District, representatives of the city of Ann Arbor, personnel from the United States Soil Conservation and subdivision land development officials resulted in the design and construction of a water run-off drain system which catches residential rooftop and grassland run-off water and drains it into the swamp/bog land depression creating 18 inches of high quality surface water for acquatic habitat. Educational program development for the swamp/bog habitat included the construction of nature trails, a walking path surrounding the swamp/bog area, planting of indigenous native tree specimens, and the over-all development of the north end of the site into a nature study center for use by students and residents of the community.

As a result of the man-made natural landscape features including

(1) a seven acre body of water (2) topographical variation (3) significant coniferous/deciduous trees and (4) the development of a microhabitat for wildlife propagation residential housing values nearest the swamp/bog habitat are increasing in market value at almost twice the yearly rate of identical residential dwellings located in the south quadrant which front on an unbuffered school parking lot area. As of 1972 market sale prices of homes near the swamp/bog habitat were selling for $7,455 more than identical residential housing located in the south quadrant.

Also, north quadrant homes are carried on the city of Ann Arbor's Property Tax Assessment Rolls at 22% higher value than identical housing units in the south quadrant. Further housing turnover (sale-resale ratio) of north quadrant homes is one and one-half (1½) times less than homes in the south quadrant. The net fiscal result to the Ann Arbor School District and related governmental units which depend upon property tax revenue for operation is an increased property tax base in the north quadrant. This expanded property tax base is sufficient to recapitalize the initial site development expenditures for the swamp/bog habitat project within a twelve year period.

ENVIRONMENT OF SCHOOL SITE PLANNING

1. LAND USE
   Urban/regional master planning constructs

2. MICROCLIMATE ENHANCEMENT
   'Green island' site development

3. BIOSPHERE IMPROVEMENT
   Global environmental quality standards

4. UNITY OF DESIGN
   Blend of natural/built environment

5. LAND FORM SCALE MODELING
   Vertical/horizontal plane configuration

6. WATER RESOURCES
   Acquatic/reclaimed land habitat

7. ESTHETICS
   Psychological/anthropological effects of beauty

ENVIRONMENT

SITE DESIGN CONCEPT 1

Land Use: urban/regional master planning constructs

1.1 Definition: Public School districts can contribute to the establishment of ecologically balanced open space systems which reflect an integrated land use pattern for the urban/regional environ, by acquiring high quality ecological value school sites. These community land resources should be selected by applying master land use planning principles. Such principles create optimal conditions for man's harmony with nature's schematic design for human productivity.

1.2 Selected Application: The site selection goals of public school districts should be based upon master planning principles which integrate the public school site with ecological land use patterns for the urban/regional environ. Careful selection of the site can minimize development problems and costs, as well as providing the opportunity to maximize its use.

Land Use: School sites should be an integral part of the open space system of a community. Open space contiguous to a school can amplify the effectiveness of the instructional program and function to create an improvement in the quality and beauty of the total environment.

School-Parks: The school-park plan offers shared facilities which can effect a mutual gain for both the school and community. Measurable mutual gains are: reduced land costs, shared maintenance costs, and reduction of required land acres. The critical gain for the school is the ability for future expansion beyond forseeable needs.

Open Space Reserves: Progressive land planners have scientifically established the need to preserve marshes, flood plains, acquifer recharge areas, steep land with grades in excess of 20% slope, prime agricultural land, and forest and woodlands. Each land type contributes to the natural processes which maintain an ecological balance and, therefore, a quality environment. School districts should place high priority in selecting land near or contiguous to permanent open space areas having high ecological value.

Open Space Zone: Open space areas set aside as greenbelts and buffer zones can provide esthetic and functional values for the school site. Esthetically the nature and dimension of the area may provide effective vistas and approaches to the school and its site, as well as softening the massiveness of schoolhouse architecture. Functionally, the greenbelt may provide an area for continuous pedestrian walkways for a safe and pleasant access to the school site. The size and nature of the greenbelt may provide effective buffering from incompatible land uses and excessive traffic noises. Greenbelt open space also absorbs air pollutants and channels desireable air movements through the school site.

Community Traffic Patterns: Community traffic patterns have considerable influence on selecting and developing a school site. Basic principles of site design should include: (1) The school site should link to a primary artery in order to avoid the necessity of motorists having to weave through the secondary street system of the neighborhood. (2) The primary pedestrian access should not be across busy primary streets. (3) The community should have direct access to the school building, outdoor facilities, and parking lots. (4) Primary indoor and outdoor school uses should avoid direct orientation to primary traffic arteries. (5) The master plan should provide physical and visual buffers between primary traffic arteries and adjacent school sites.

Historical Aspects: Historical preservation of the environment should be a primary design input for school site selection and/or school site renovation. The recent concern for environmental quality has developed valid rationale for preserving the essence of the older portions of our communities. School site development and selection must carefully recognize the character of these zones. The entire school site program can have a different and innovative approach that is more compatible with the restraints and advantages of the older neighborhoods.

1.3 Case Example: The State of Michigan recently passed comprehensive land use legislation designating the county unit of government as the central planning and coordinating agency. This legislation affects the Ann Arbor Public School District which is developing a 118 acre land parcel for a third high school in the northwest section of Washtenaw County, Michigan.

One of the major land use regulations indicates that public school districts must develop master plans for existing school sites and create educational site specifications for future sites. Public school sites must now become an integral part of an open space system for each county.

Local government decisions indicate that the land units of the Northwest Education Center Site, Newport Elementary Site, Huron

River Watershed Flood Plain, Bird Hills Park Development, Wines/ Forsythe School Site, and the Smokler Corporation Land Holdings must be interconnected and provide the northwest pedestrian linkage of the open space system for this land region.

The legislation if designed to provide a higher quality environment for the residents of each county through short term and long range master planning of regions. The Ann Arbor Public School officials, city-county agencies, and the University of Michigan are developing a master land use plan. This plan will utilize public school sites and related open space lands to create a northwest open space system which will conform with the intent and spirit of the enacted land use legislation. In order to accomplish this task, the following criteria were developed to guide school officials, planners, government agencies, and related disciplines to yield a balanced environmental solution.

ECONOMIC PLANNING

Incorporate land design features to create optimum conditions applicable to the "Principles of Unearned Land Rent" thus generating significant real property land value appreciation which results in the recapitalization of initial investment within a thirty (30) year duration.

ECONOMIC PLANNING CRITERIA

1. Public Tax Expenditures: Funds used to purchase school sites are an investment not a cost.
2. Master Site Planning: School sites comprehensively planned and well-developed become self-liquidating projects.
3. Property Tax Revenue Effect: School sites significantly affect the "State Equalized Valuation" of surrounding residential real estate and thus influence the total property tax revenue derived from residential properties.
4. Property Tax Base Effect: Replanned and renovated school sites are self-liquidating, expanding property tax base projects.
5. "The Ripple Effect": School sites exert significant economic affects upon the free market choices of prospective home buyers.
6. Municipal Overburden Effect: School sites having "Open Space Acreage Standards" reduce the costs of operating municipal government.
7. School-Park Sites: These community land resources reduce the turnover rate of housing (sale-resale ratio) and thus produce a stabilizing affect upon neighborhood property values.
8. School-Park Sites: These neighborhood "common lands" are a major factor in preventing "future" ghettos.
9. Economic Value of Trees and Vegetation: Mature shade trees and variety of vegetation on school sites are natural amenties which expand the property tax base and also yield higher market sale prices

for surrounding residential real estate.

10. Multi-Agency Planning: Joint cooperative agency planning for school site selection, planning and development results in substantial dollar savings.

ENVIRONMENTAL PLANNING

Adhere to strict environmental impact control regulations of land development focusing upon the preservation of the natural character of land, its unique features, and resources, thus producing optimum land development, management and use.

ENVIRONMENT PLANNING CRITERIA

Site Analysis

1. Slope Analysis - Land Form Topography

   slope categories 0 to 6%, 6 to 12%, 12 to 20%, 20%+

2. Vegetation & Wildlife

   primary plant communities
   list predominant species

3. Drainage Patterns & Surface Water

   include primary watersheds
   seasonal & permanent
   water table

4. Soils & Solid Geology

   general surficial information from Soil Conservation Service
   soil boring data
   depths to strata
   underlying rock structure
   degrees of permeability

5. Climate & Erosion Potential

   macro - regional
   micro - local, primarily within the site
   water & wind

6. Environment, Scale, Esthetics Beyond Site Boundaries

   views, nuisance impact, indigenous character in relation to environment & human

Regional Analysis - Planning Constraints

1. Utilities

   location, type, pressures, power capabilities

2. Vehicular & Pedestrian Patterns

   major arteries & paths

3. Traffic Demands

   existing & proposed patterns

4. Easements, Rights of Way

   legal inferences

5. Zoning

   type, restrictions

6. Building Codes

   Township, City, County, State, Federal

7. Mineral Rights

   oil & gas rights

8. Water Resources

   quality & type

9. Soil Boring Data

   Engineering studies, Soil Conservation Service Maps

10. Land Use

    patterns & projected use

[redacted]

SEC. I (cont.) WHAT HAPPENS TO LAND HAPPENS TO PEOPLE

SEC. II ENLARGING THE CONCEPT OF SCHOOL SITES AS RESOURCES, THEIR OPTIMUM DEVELOPMENT, USE, AND MANAGEMENT

A PROPOSAL TO UNDERTAKE AN INTERDISCIPLINARY PROJECT RELATED TO SCHOOL SITES AS 'RESOURCES'

		WORLD-WIDE NEED TO RE-EVALUATE RESOURCES			MICHIGAN RE-EVALUATION OF SCHOOL SITES AS RESOURCES		COMPONENTS OF THE PROJECT REQUEST								
							ASPIRATIONS			PROPOSED ACTION PROGRAM	PROPOSED FINAL PRODUCTS	IMPLEMENTATION OF THE PROJECT			EXHIBITS RESULTING FROM PRELIM. STUDY
A	THE PRECEPTS	International	United States	Michigan	Status	Conclusions	Objectives	Expectations	Collateral Values			Staff	Time	Budget	
B	1	The 'Resources' of School Sites Are Under-Developed, Under-Used, and Under-Managed													
C															
D	2	A Sense of 'Stewardship' of the Land Leads to the Optimum Development, Use, and Management of School Sites as 'Resources' . . .													
E															
F	3	The Purpose of Schools Will Be Achieved Better by Wiser Use of School Sites													
G															

SEC. III INTER-AGENCY INVOLVEMENT, AGREEMENT, AND ACTIONS

H															
I															

ENVIRONMENT

SITE DESIGN CONCEPT 2

Microclimate Enhancement: green island site development

2.1 Definition: The scientific application of living, breathing plant material to public school sites which alters the adverse effects of an uncomfortable, uniform, local climate. Green island school sites contribute to a more pleasant and livable environment for man by intercepting precipitation and solar radiation and through controlling wind and temperature variations.

2.2 Selected Application: Technological advances in the field of landscape architecture have created optimum conditions for the transplanting of significant shade trees on school sites. Most school officials tend to think in terms of transplanting small seedlings; the consequence of this action is a lifetime waiting period for the maturity of seedling growth. Cost quotes from the State of Michigan Nursery Association and Michigan Society of Landscape Architects indicate that 8" diameter shade trees can be transplanted on school sites for $125.00 to $150.00 each. If these shade trees are donated to the local school district for transplanting on school sites by residents within the school district, the trees can become a federal tax exemption for the donors. The board of education or community residents can establish a "Federal Tax Exempt Tree Foundation" similar to the Miami Florida Tree Preservation Program which allows the Dade County Board of Education to accept the gift through the foundation, thus creating the tax exemption for the donor.

Deciduous shade tree research, conducted by Wally Scott of Caudill, Rowlett, Scott of Houston, Texas, sheds educational light on the mechanical refrigeration potential cost savings of an 8" diameter deciduous shade tree with a height of 35 feet. This tree transpires 160 gallons of water per day, or the equivalent of two tons of articificial mechanical refrigeration. The beneficial cooling effects of this shade tree should be of unique consequence in determining the cooling energy necessary for the operation of an educational facility. The cost for installing two tons of artificial mechanical refrigeration in an educational facility ranges between $3,000.00 to $4,000.00. The cost differential of the transplanted deciduous shade tree ($125.00 to $150.00) versus artificial mechanical refrigeration ($3,000.00 to $4,000.00) represents a cost alternative approach for boards of education of significant dollar savings.

Shading of interior classrooms is a necessary nuisance. That is, a nuisance to operate, impossible to keep clean, expensive even at its cheapest (considering the frequent replacements). The alternatives to shade trees often ruin the clean simple lines of the classroom interior. Venetian blinds allow ventilation when drawn, roller shades allow shading sufficient for film projection, draw curtains can be made decorative and add to classroom attractiveness, but all are second choices. Shading technology has led to such inventions as placing the sun control device outside of the window. Devices such as brows, overhands, control vanes (vertical mostly, operative sometimes) or a kind of tracery screen, made of metal, wood, or masonry units are used. The initial cost and continuing maintenance of these devices far exceeds their utility. The dreary horizon of mechanical artificiality which they sometimes set between the window and the outside world denies the very reason for which the window was installed; namely to see through to the outside world.

There is, however, one variant of the screen which combines all its advantages with minimum drawbacks. It is pleasing to look at from the inside and outside, fully automatic and self-adjusting to the seasons. It opens to a hardly noticeable tracery in the late fall, when sunlight begins to change from bane to blessing and closes again with the coming of spring. It is self-maintaining and self-replacing. It repaints itself at no cost every year. It is made by the oldest manufacturer of building materials, who spends nothing on advertising, and depends on promotion by the cultural arts. Living, breathing, plant material, namely deciduous shade trees, offer possibilities for sun-control not available in man-designed systems. Plant materials are hardly explored by school officials, and rarely fully used.

2.3 Case Example: The University of Michigan's School of Education auditorium provided the field research project for an innovative graduate student's microclimotology study. The research focused upon the development of site specifications and cost analyses for the west exterior land adjacent to Schorling Auditorium, for the purpose of regulating the solar radiation vector rays.

The Schorling Auditorium has nine vertical windows measuring 130" by 50" which face due west. There are two sugar maples present on this site; the auditorium does not receive adequate shade from the late afternoon solar rays. The direct rays of the sun create uncontrolled glare and causes uncomfortably warm conditions in the auditorium.

There were two microclimotology design solutions to this problem. One solution was the creation of a natural screen of plant material. The other solution was found to be expensive and detracted from the architectural style of the building. The administration of the School of Education decided to create a natural greenery shield.

GENERAL SITE SPECIFICATIONS

The sugar maples already present on the Schorling Site provided a minimal amount of shade in the summer. The problems were compounded in the winter months, since these were deciduous trees. Evergreens were considered for a secondary screen located between the sugar maples and the building.

In addition to providing shade, the plants selected were colorful so as to make the site more attractive and also harmonize with the existing plant life adjacent to the Schorling Site. The selection of trees and shrubs was limited to those indigenous to Michigan.

SPECIFIC SITE SPECIFICATIONS

The following list of trees and shrubs were planted on the Schorling Site. Suggested placement of these plants along with existing plants is illustrated in Figure ( ).

(1) White Pine (Pinus strobus). This is a large, slow maturing conifer. It exceeds 40' in height, and can be planted in 8' to 10' heights to provide immediate sun shade. It is the Michigan State Tree.

(2) Japanese Yew (Taxus cupidata capitata). This is a dense, pyramidal, slow maturing evergreen. It has an average height of 10' to 15'.

(2) Late Lilac (Syringa Villosa). This hardy shrub with course textured foliage has rosy-lilac flowers in early June. Its average height is 10', but it can be shaped to shorter heights.

(2) Blueleaf Honeysuckle (Lonicera Korolkowi). This has blue-green foliage and rose pink flowers in late May. Bright red berries appear in July and August. It may reach 12' in height.

(2) Witherod Viburnum (Viburnum cassinoides). Its bright green leaves in summer turn purplish-red to orange-red in autumn. Creamy-white flowers bloom in early June. Its berries are first yellow-green, then pink, red, and finally bluish-black. Its average height is 6'.

COST DATA FOR SOLAR RADIATION GREENERY SHIELD

-SCHORLING AUDITORIUM SITE-

QTY.	NAME	SIZE	UNIT PRICE	AMOUNT
1	White Pine Pinus strobus	8'-10'	$120.00	$120.00
2	Japanese Yew Taxus cupidata capitata	3½'-4'	$ 80.00	$160.00
2	Late Lilac Syringa villosa	3'-4'	$ 20.00	$ 40.00
2	Blueleaf Honeysuckle Lonicera korolkowi	3'-4'	$ 20.00	$ 40.00
2	Witherod Viburnum Viburnum cassinoides	3'-4'	$ 20.00	$ 40.00
			TOTAL	$400.00

This selection of trees and shrubs, when planted in the suggested design arrangement, provided an effective year-around screen from direct rays of the sun as well as from reflected glare. This reduced the interior temperature of the auditorium in the summer and aided insulation during the winter.

Implementation of this landscape design program was relatively inexpensive and caused minimal disruption of the site. The benefits provided by the natural screen were well worth the total expenditure.

ENVIRONMENT

SITE DESIGN CONCEPT 3

Biosphere Improvement: global environmental quality standards

3.1 Definition: The design and ecological development of a school site contributes to an enhanced global medium for living, breathing plant and animal life. The site contributes to the formation of water molecules for the purification of the atmosphere. Its plants absorb ample supplies of sun energy for photosynthetic process production by providing oxygen and carbon dioxide for the replenishment of the atmosphere.

3.2 Selected Application: Life is maintained by the finite amount of solar energy that is fixed by green plants. An increasing fraction of that energy is being diverted to the direct support of one living species: man.

The energy that sustains all living systems is solar energy. It is fixed in photosynthesis and held briefly in the biosphere before it is re-radiated into space as heat. It is solar energy that moves the rabbit, the deer, the whale, and the school youngster on the bicycle. The total amount of solar energy fixed on the earth sets one limit on the total amount of life. The patterns of flow of this energy through the earth's ecosystems set additional limits on the kinds of life on the earth.

Green plants are the primary producers of the biosphere, converting solar energy into organic compounds that maintain the plants and other living things. School sites which have been designed and developed for ecological purposes contribute to a high quality global environment.

The living, breathing plant materials placed upon the site to maintain a balanced biosphere may serve multiple design functions:

1. Trees can be used as a windbreak to warm the school during the winter.
2. Hedges provide living snow fences at drives and parking areas.
3. Low trees and hedges screen off unsightly areas.
4. Trees and bushes as light control soften natural light and reduce glare from snow or concrete paving.
5. Trees can be an effective means of sound control to absorb playground roar and to block out disagreeable traffic noises.
6. Both pedestrian and car traffic can be controlled by planned plantings.
7. Outdoor class areas can be enhanced with pleasant shade trees.
8. Temperature and ventilation can be better controlled with the use of large shade trees.

School sites need to be evaluated for bioclimatic conditions before the final landscape design is implemented. A schematic bioclimatic index should include prevailing climatic conditions and clearly delineate corrective measures to insure quality temperature and humidity on the site.

When the bioclimatic conditions of air temperature, solar radiation, wind velocity, and humidity have been evaluated, a determination can be made as to the necessary type of climate control necessary to provide human comfort. A sun shade, a wind screen, a canopy to deflect rain or to cool, or combinations of all of these can be used to control or ameliorate climate. In addition, walls, fences, earth forms and free-standing roofed structures may be designed. Objects and element may alter the climate positively or negatively. They may ameliorate or aggravate climate conditions or problems. That is, they may either increase or decrease man's comfort.

Plants play a significant role in climate control, but their capabilities have not been fully understood by educators.

3.3 Case Example: The Preliminary Site Study of the Tyee Senior High School, Highline School District, Seattle, Washington, shows the original concept of combining the high school buildings with a community park. On the 40 acre site there is an abandoned gravel pit which creates different ground levels that are adaptable to various functions.

Study of this preliminary plan by officials of the King County Park System and Highline School District convinced them of the feasibility of developing a 10 acre school site and 30 acre park immediately adjacent. The whole site could then be used jointly for school and community functions.

The Tyee Senior High School Building Plan indicates how the final building arrangement and landscaping were completed with landscaping around the building flowing into the park area to integrate the entire complex. (Note the consistent repetition of plant materials.)

Plant materials have been established on this site for only six months. Currently a class in horticulture is conducting an experiment by planting pole beans to grow on many of the young trees. This project is another illustration that landscaping should be functional, as well as esthetic.

ENVIRONMENT

SITE DESIGN CONCEPT 4

Unity of Design: blend of natural and built environment

4.1 Definition: Creative educational site and facility architecture combines program function and esthetics to achieve a design configuration which imparts the psychological feeling that the educational facility is a natural extension of the school site environ. This unity of site and facility design is a unique blend of the natural and man-made environment.

4.2 Selected Application: Creative architecture results in a "vista view" or "landscape" which has merit as a work of art just as an artist's representation on canvas. Architectural design does not compromise function. It combines function with appearance to achieve an educational facility which is highly functional and reflects a physical configuration of man-built beauty.

When the concept of unity of design is acknowledged by school officials, the school site becomes an integral part of the total educational facility. This unity of site and facility design can be accomplished through the creative talents of the facility architect in joint concert with the landscape architect. The school site can be designed to include specific zones of specified activities. Preservation of natural topographic features, however, should assume a high priority. The total value of the school site will then reflect educational and recreational assets for the community.

There is an exciting challenge to a small wooded habitat, to the hummock crowned with trees, to the slight terrain embankment, the climbing tree, or to any variation from the monotony of a level, biologically barren school site. Children can use these beauty environs for play, for reading, or for nature study. Adults can come there for relaxation, picnics, or recreational activities. There is beauty in the natural provision of water, vegetation, and rolling land which will contribute to the esthetic appearance of the educational facility if educational planning is sufficiently inclusive and imaginative.

The accomplishment of unity of design is often difficult for school districts. Esthetic appearance of the educational facility is often confused with formal arrangement of landscaping elements including disease-prone exotic, ornamental plantings. Creative educational facility design has been described as fitting a particular type of educational facility to the unique character of the site. If the facility is well-fitted to the site, there is no need for extensive basal plantings to hide the unattractive foundations, corner plantings to bring harsh structural lines into perspective, or specimen trees to create external centers of interest in the hope of diverting attention form an unsightly education facility.

The functional uses of landscape architecture include temperature and ventilation control, acoustic and visual screen, and traffic regulation on the site. The appropriate choice and arrangement of elements for carrying out these functions need not conflict with esthetic considerations of texture, form, and color. If the total effect of the educational site and facility is kept in focus, a unity of design which blends the natural and man-built environment can be realized.

4.3 Case Example: The Sheldon High School, Eugene Public Schools, Eugene, Oregon, represents a prime case study of the concept of unity of design, the blending of the natural and man-made environment.

The basic concept of the educational facility is one of windowless classrooms and interior hallways, meeting in locker open court spaces. Courts are open to daylight and lushly developed with native plant material, many of which are native to areas in southern Oregon. Use of plant material is possible because of the tempered climate of low-heated interior passageways.

The educational community of Eugene, Oregon, recognized that not all learning and social growth is accomplished in the classroom. While basically serving other uses, many spaces of this high school are designed to provide the student with mental release and change of pace during the academic day. This change can range from a momentary change of vista to a dynamic experience.

Of unique design is the plaza with its stepped podium and covered promenades which serve as a central meeting place for student meetings, rallies, and noontime gatherings. The four interior squares and connecting broad main streets give students the opportunity to meet and form friendships. The broad entry colonnade serves students waiting for transportation or meeting friends before and after school. Bench groupings are used around planted areas to create small-scale places inviting to groups of students.

The Sheldon High School Site has been developed jointly by the Eugene School District and Eugene Park Department. The site includes facilities of a covered swimming pool, community recreation hall, public park, playfields, tennis courts, handball courts, ball fields, picnic area, and children's play area. Upon visual inspection of the educational facility and site, the psychological feeling is that this educational complex has truly accomplished a unity of design intrinsic in creative architecture and landscape architecture.

SITE DESIGN CONCEPT 5

Land Form Scale Modeling: vertical and horizontal plane configuration

5.1 Definition: The application of aerial photogrammetric methods, field engineering vertical and horizontal land reference points and computer scanning techniques yields a two (2) foot contour map of 640 acres (1 square mile) including coniferous and deciduous vegetation zones. This technology allows planners to acquire high quality contour maps for a fraction of the cost compared with traditional field engineering contour mapping.

5.2 Selected Application: Fiscal decisions relating to a quality environment can be enhanced by creating an educational land data bank of school sites and public lands within the school district. This educational land data bank allows planners to base school site development decisions upon more scientific data. An essential series of resource documents for the data bank are two foot land contour maps of existing school sites and future sites within the school district.

Using conventional aircraft a flight projectory can be flown over a parcel of land with aerial contact photo prints scaled at one inch to 300 feet being developed. The parcel of land (school site, park land, or ecological preserve) to be mapped (2 foot intervals) is abstracted from the contact prints and increased in size. (2½ ft. X 4 ft.) Eight vertical and horizontal ground control reference points are established with survey transit equipment by an engineering firm which denote the high and low elevation points of the site. (640 acres)

The computer scanner of the aircraft measures the changes in elevation and correlates the ground control reference points with the elevation scanning differences. The two foot contour lines are then connected creating an accurate two foot interval map of the terrain. The photogrammetric technique for contour mapping yields three planning documents.

1. Aerial Photo Mylar: Denotes the physical land forms of the terrain. Scale of one inch to forty feet can be created or other appropriate scales developed. (1" = 100 ft.)
2. Aerial Photo Myler/2 Ft. Contours: Denotes two foot intervals scribed on the aerial photograph mylar. Provides the planning document for analysis and interpretation of land forms, drainage patterns, slope analysis, vegetation plant communities, erosion potential, site ecology, environment, scale and esthetics beyond the site.
3. Blueprint Contour Mylar: Denotes two foot contour lines of the site including major vegetation zones. This mylar can become a working field document for use by landscape architects, natural resource specialists, and land evaluators.

The 2 Foot Photogrammetric Contour Mapping Technique has the capacity for mapping 640 acres (1 square mile). With this information the public school officials can initiate the land data base for multi-agency planning agreements. For example, site selection for an educational facility could include park land and ecological preserve mapping contained within a one square mile environ. The development of multi-agency contracts for establishing open space for a region is now within the realm of the educational leadership of school districts.

Feasibility applications for public school districts ensue:

1. Master Site Planning: Land forms can be mapped to indicate their relationship (physical patterns for people paths, streets and circulation) to the educational facility setting.
2. Land Form Scale Models: Computerized graphs and scale models can be built by students and faculty denoting the school site amenities and surrounding regional environs.

3. Transportation: School bus routing can be more acurately determined as related to land contours of the school district. Preventative safety evaluation of bus turn around stations, pickup zones, drop off zones which relate to increased safety can be studied. Potential hazard roadway areas of snow drifting, ice impaction, and flooding can be identified.

4. Land Use: Governmental agencies which supply zoning maps, land use maps, legal surveys, natural resource data, traffic patterns and appropriate land use data can be added to the Blueprint Contour Mylar as a permanent inventory for the school district.

5. Educational Facility and Site Planning: General information usually gathered with field visitations can be accomplished at the office level. Selected applications ensue:
    a. determine the square footage of parking lots for asphalt repair
    b. determine potential drainage problems of future and/or existing school sites
    c. determine the square footage of school sites for purchasing grass seed and fertilizer
    d. determine heat loss from educational facilities using infrared film at the time of contour mapping of sites
    e. determine the health of vegetation using infrared film at the time of contour mapping of sites

5.3 Case Example: Professors from the Schools of Education and Natural Resources of the University of Michigan selected a forestry research land parcel for the 2 foot contour photogrammetric analysis. The environmental education site (17.12 acres), Pt. of E ½ of NW ¼ of Section 7 T1S-R5E Webster Township, Washtenaw County, Michigan, U.S.A., is part of a glacial formation representing the second highest point in southeastern Michigan. The site borders on the University of Michigan International Research Forest (169 acres); possesses unique glacial deposits (kettle moraines, kames, eskers); has a unique soil type (Fox Loamy Sand); is undulated with mature oaks, ash, hickory, red cedar, and black locust; and contains two U.S. Department of Agriculture Soil Conservation Service Research Plant Zones.

On December 3, 1975, Abrams Aerial Survey Corporation of Lansing, Michigan, aerial surveyed the site and produced photographic contact prints scaled at 1" to 300 feet. The engineering-architectural firm of Ayres, Lewis, Norris, & May, Inc. of Ann Arbor, Michigan, established the vertical and horizontal ground control reference points to yield a scale of 1" to 40 feet. The environmental education site had been previously surveyed for legal description. These additional reference points were incorporated into the photogrammetric analysis. The aerial, engineering, and computer technique produced three practical field documents.

1. Aerial Photography Mylar for blueprint reproductions of the site and surrounding environs. (Scale 1" = 40 ft.)
2. Aerial Photography Mylar with 2 Ft Contour Lines for blueprint reproductions of the site. (Scale 1" = 40 ft.)
3. 2 Ft. Contour Mylar for blueprint reproductions of the site. (Scale 1" = 40 ft.) Additional data transcribed onto this mylar included legal boundary description, Coniferous Windbreak Zone, Unique Land Forms, Historical Site References, U.S.S.C.S. Plant Research Zones, Vertical and Horizontal Ground Control Reference Points, Natural Vegetation Buffer Zones, Access Roadway, Open Field Coniferous and Deciduous Vegetation, and Project Researchers.

The full commercial rate value for aerial and engineering services rendered was $1369.90. Cost Benefit Analysis of traditional survey techniques for producing a comparable two foot contour map yielded $34,000.00, a net cost savings of $32,630.10. It should be noted that the uniqueness of the site would produce great difficulty if traditional engineering survey techniques were employed. The Aerial Photogrammetric Contour Mapping Technique can be applied to 640 acres (1 square mile) for the relative cost of the 17.12 acre environmental education site.

SITE DESIGN CONCEPT 6

Water Resources: aquatic and reclaimed land habitat

6.1 Definition: The collection and recycling of all water which falls on the school site watershed for purposes of sub-surface irrigation, sub-soil recharging, and aquatic development of a water resource reservoir.

6.2 Selected Application: School districts need not eliminate well-landscaped sites as a result of high municipal and/or inadequate supplies of water. They should consider the desirability of collecting the runoff water from schoolhouse roofs, parking lots, and grassland areas in water reservoirs or holding ponds on the school site. This runoff, since it is not to be used for human consumption, would not have to be secondarily treated by municipal waste water plants at taxpayer expense. The potential cost savings over the life cycle of the school building would more than pay for the site development project.

Engineering irrigation and drainage systems have been installed and field-tested in several midwestern school districts. This would indicate that annual precipitation can be economically collected and recycled for irrigation purposes on the school site. These water recycling systems are designed not only to save a school district valuable tax revenue, but also to enhance the environmental quality of the school site.

PLAN I SUBSURFACE TERRAIN IRRIGATION

Rain water is collected from the roof top of the schoolhouse, parking lots (salt free), and the surrounding school site watershed and channeled through eight (8) foot vinyl plastic waterproof drain tiles to the athletic fields. The waterproof drain tiles have tight joints which elimate the problem of tree root penetration. Runoff water from the watershed enters the drainage system through surface inlets.

The athletic fields are tiled differently than for normal drainage patterns. The drain tile is set level instead of having a slight downward grade because water is to be stored instead of escaping into the drain field. To hold water in the level drain tile it is necessary to provide a check flow point at the end of the drainage field opposite the source of the runoff water. This check flow point is sloped upward, six (6) to nine (9) feet, before it connects with the main line which carries excess water to the water reservoir or holding pond.

During heavy rainfalls provision is made for excess water to over-flow the drain tile field. This water flows over a slight slope at the end of the athletic field where it is collected in the large main line and carried to a water reservoir or holding pond on the school site.

If a water reservoir or holding pond is impractical to construct on the school site, storage of excess water can be provided by recharge pits. Recharge pits are shafts which are sunk into the ground to a depth that allows water to pass through the impervious clay layer, eventually becoming part of the underground water system. The underground water becomes more plentiful and insures water for the future.

PLAN II WATER RESERVOIR OR HOLDING POND RECYCLING

This water system involves the pumping of water from a water reservoir or holding pond to specific areas of the school site. Athletic fields are designed to drain into a main line which also carries water from the schoolhouse roof, parking lots (salt free), and surrounding school site watershed.

Once the water reservoir or holding pond has a sufficient water level, an irrigation or drainage system can be economically installed with lightweight four-inch aluminum pipe and quick coupling joints. Sprinkler nozzle guns are attached to the aluminum tubing for uniform water distribution. This irrigation or drainage system uses a 40-hoursepower gasoline motor to power the water pump. The proper amount of water for a given land surface can be regulated by controlling the amount of gasoline put into the fuel tank. Field experience indicates the length of time necessary for the water to be pumped before the engine shuts off as it runs out of gasoline. Since the athletic fields are adequately tile drained, water which seeps into the irrigation drain tile field returns to the water reservoir or holding pond to be recycled again.

The economic advantages of Plan I Subsurface Terrain Irrigation and Plan II Water Reservoir or Holding Pond Recycling are of major consequence to school officials. These water systems yield the following positive results:

1. Eliminates man hours involved in maintaining irrigation equipment.
2. Allows plants to develop long root systems to meet the water which seeps toward the surface through capillary action.
3. Saves precious water as evaporation associated with sprinkling is diminshed.
4. Applies the highest quality water available to the desired areas of the school site.
5. Produces substantial long range cost savings through non-purchase of commercial water from the municipal water supply.

6.3 Case Example: The Armstrong Middle School holding pond in the Kearsley Community School District, Genesee Township, Michigan, is an excellent example of aquatic reclaimed land. The process of developing the holding pond is a model any school district could use.

The Outdoor Education Advisory Committee of Armstrong Middle School first did research into various types of wet and dry ponds. They took the following factors into consideration:

1. surrounding terrain
2. types of soil on the site
3. community surrounding the area
4. cost factors
5. recreational needs
6. educational needs
7. water content of wet ponds
8. natural resources.

The committee, after careful consideration of both dry and wet ponds, recommended to the Kearsley Board of Education the development of a wet pond for the following reasons:

1. wet pond can be used year round for fishing, skating, other community uses
2. terrain lends itself to a wet pond since it is a low area and in a natural setting
3. more expensive to build and maintain a dry pond due to cost of installation of tiles under bottom and grass cutting and other maintenance if it is to be used for recreation
4. surrounding community would be esthetically improved
5. extensive moisture retention due to poor soil drainage could lead to mosquito problem, wet pond would have fish to alleviate problem
6. research has shown that a natural wet pond in this type of setting will increase property values of surrounding property by as much as 20%, thus increasing income from school taxes

After examination of the Armstrong site the committee made a primary and alternate recommendation as to the best location for the holding pond. The primary site south of Webb Drive was chosen (See Figure A-1). The Webb site was chosen for various reasons. It was a natural low area. Soil studies indicated that this area was a former lake bottom. This area is not conducive to future building, but would have easy access from Webb Drive. The location is central to drainage areas, hence, would save many hundreds of feet of drain tile. The site would enhance surrounding property values and serve the various recreational needs of the community.

To serve the recreational and educational needs of the community pond inlet-outlet ditch specifications were determined for the retention pond project:

1. a small island can easily be left to attract and accomodate wildlife naturally
2. excavation of a sub-pond to a depth of 10 feet to insure fish survival during winter months
3. minimum regular pond depth of 6 feet to insure against stagnation

4. ditches should be constructed in a natural winding design, conserving trees and shrubs for a natural appearance

5. any large boulders unearthed while excavating should be left on the site

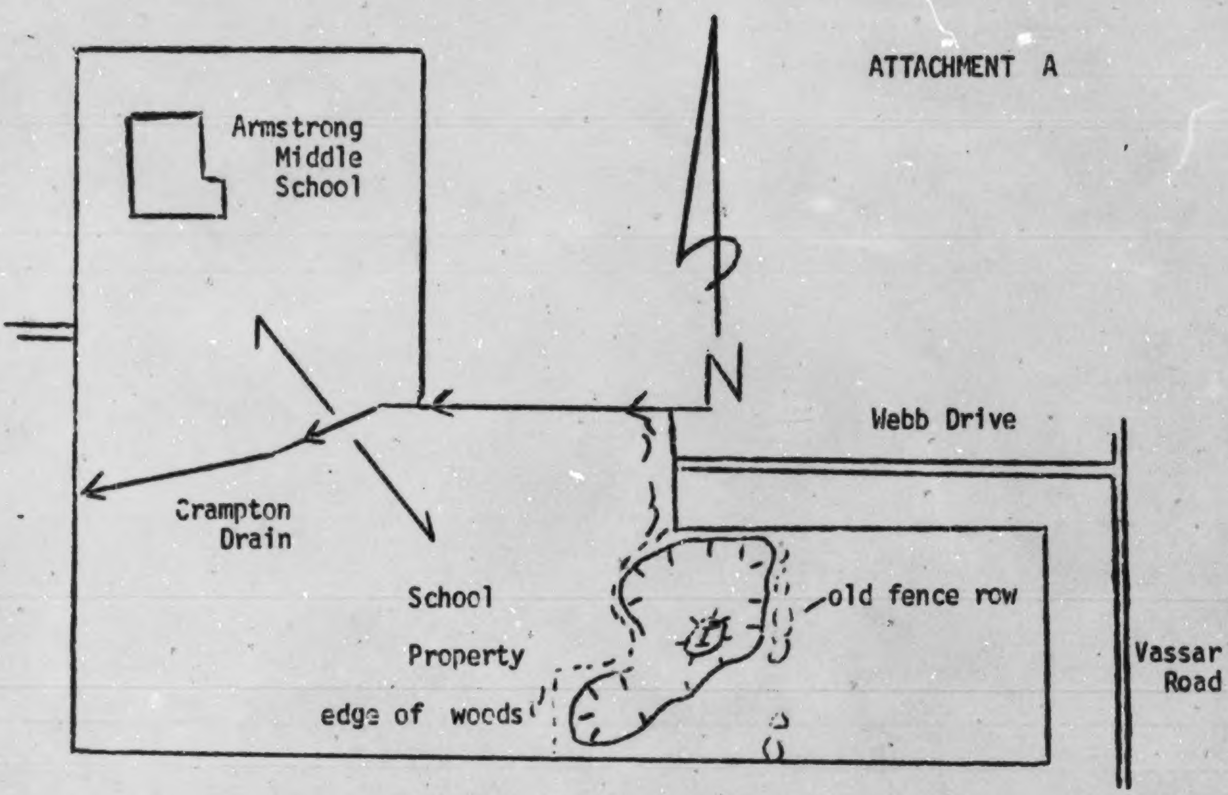
6. the area surrounding the site be left in its natural state

The committee recommended that the dirt from the six acre pond excavation be used on the Armstrong site in order to develop a large hill on the athletic field. The hill would be 20 feet high, 100 feet wide and 400 feet long. This hill would require approximately 20,000 cubic yards of fill. By creating the hill the township would save considerable money in moving costs. The hill would offer many recreational activities such as sledding, skiiing, and play at noon recess.

Besides the large hill, other fill dirt could be used for filling in low areas of athletic fields, raising levels of woodland trails unusable when water is high, and as topsoil at other sites for seeding, landscaping, etc.

Through careful planning the Armstrong site now has a holding pond and 44 acre lake. The pond provides numerous homes for aquatic plant and animal life. The pond benefits the school and community economically, educationally, and esthetically while providing extensive recreational uses.

ATTACHMENT A


Armstrong
Middle
School
N
Webb Drive
Crampton
Drain
School
Property
old fence row
edge of woods
Vassar
Road

Armstrong Middle School Site

- Island

Proposed Location #1 - for Genesee township storm Drain Flood Water Detention Basin

SITE DESIGN CONCEPT 7

Esthetics: psychological and anthropological effects of beauty

7.1 Definition: The creation of esthetics which reflect the psychological and anthropological effects of beauty on a school site is a landscape architecture design achievement. Site design that inspires must be carefully planned.

7.2 Selected Application: An important evolutionary product of comprehensive school site planning and development is beauty. It is most important that beauty be a normal part of the student's environmental surroundings. Accordingly, most of his/her impressionable waking hours are influenced, consciously or unconsciously, by the physical atmosphere of the school site environ.

The psychological and anthropological effects of beauty should not be underestimated. The desire for beauty is especially apparent in our increasingly materialistic society where spiritual concepts are apt to be less valued in the frenetic struggle for the dollar. Despite the huckster attitude, beauty is still a powerful motive in the life of the individual. It plays a major part in the search for a spouse, determination of a dwelling or car purchase, selection of a high quality restaurant, and choice of clothing.

Even the taxpayers' association which opposes the expenditure of public funds for anything but the cheapest and barest of necessities is similarly motivated. For, as time passes and the strident cries of this organization die down, the beautiful school and surrounding site remain, and the cost becomes a dead issue. Accordingly, the now mollified taxpayer entertains his/her visiting relatives by showing off the pride of the community, the beautiful school and site environ.

In an educational facility beauty makes itself felt in many ways. The child feels happier, learns more quickly, and is prouder of his/her school. The teacher has more stamina, is more patient, and more relaxed. Custodial and maintenance costs diminish. If there were a sure-fire way to incorporate beauty into every educational facility, it could soon be proved that beauty is one of the most cost saving elements of educational facility planning.

Even the citizen who never crosses a school building threshold from one year to the next feels its impact. The atmosphere created by the facility location and site landscape will be of major importance in conditioning his/her attitudes toward public school education. An unattractive educational facility creates an unconscious antipathy which is easily translated into complete apathy, passive hostility, or active opposition to public education. How many stay-at-homes in school board elections, how many "no" votes in a bond election would have been responsive "yes" votes had there been a cheerful, well-planned, landscaped school site?

Consider, too, the effect on the neighborhood of a trim, warm-looking school on a large, well-developed site for both school and community use. Consider the pleasure of attractive landscaping, adequate parking and the absence of traffic problems, and an over-all feeling of welcome and stability. Are residential property values affected? Is community spirit fostered? Does a friendly neighborhood develop? Are more votes cast in elections? There can be little doubt that the answer is a resounding "yes".

7.3 Case Example: The development of a written educational site philosophy for the Edsel Ford High School, Dearborn, Michigan, was fundamental in creating the atmosphere for esthetic landscape design of the high school site. This pholosophy reflects an understanding of the intrinsic psychological and anthropological values of beauty inherent in a high quality educational program. Listed are six (6) major tenets of the site philosophy which provided the inspirational framework for the landscape architect.

EDSEL FORD HIGH SCHOOL - DEARBORN PUBLIC SCHOOL DISTRICT

SITE ESTHETICS: SPECIFICATIONS FOR DESIGN

1. The site for the Edsel Ford High School is as important as the school building. Jointly designed, the school building and site should give a feeling that man is in harmony with nature.

2. The Edsel Ford High School buildings should be designed to complement the site. It is desireable to preserve the unique native trees and vegetation and to blend these natural amenities into a master plan for landscape beautification.

3. Cultural growth and esthetic appreciation on this high school site can be stimulated by creative landscape design. An esthetically designed site can create impressions for youth and adults which carry over into future years.

4. The greatest good for the Edsel Ford neighborhood will be promoted when the high school site is esthetically attractive and offers opportunities for all residents. If the land of the Edsel Ford High School is preserved for its uniqueness and conserved wisely, it can be enjoyed by all persons at any time.

5. The Edsel Ford High School Site is unique and offers many interesting and useful features in terms of topography, flora and fauna and water resources. The educational environment would be greatly enhanced by preserving the existing landforms and unique natural vegetation.

6. An esthetically designed Edsel Ford High School Site can result through wise planning and execution. Our goal is to insure posterity that this high school site will remain beautiful and that the high school buildings to be located

> on the site will truly become a complement to the existing natural environment.

Upon the completion of this written philosophical statement of site esthetics, the Dearborn Public School District proceeded to develop written educational specifications for land use and design for the new high school site and facility.

Courtyards were designed and developed with mirror ponds, natural habitats were created for wildlife, native tree species were planted to complement existing vegetation, building orientation was studied to maximize climatology, the educational facility was designed to blend with the natural terrain, and site design truly represented psychological and anthropological effects of natural beauty.

EDUCATIONAL OUTCOMES OF SCHOOL SITE PLANNING

1. EDUCATIONAL SITE POLICY
   Guidelines for school-community land resources

2. NATURAL LAND RESOURCE INVENTORY
   Educational potential of land

3. INTERDISCIPLINARY EDUCATIONAL PLANNING
   Interagency site involvement

4. EDUCATIONAL SITE SPECIFICATIONS
   Written statements of program requirements

5. LANDS FOR LEARNING
   Outdoor classrooms on school sites

6. CHILDREN'S PLAY ENVIRONS
   Design for optimal potential growth

7. SOCIAL MEMORY OF LAND
   Land holds vestiges of man's occupation

EDUCATIONAL OUTCOMES

SITE DESIGN CONCEPT 1

Educational Site Policy: guidelines for school-community land resources

1.1 Definition: The educational site policy is a written document representing the guidelines for site selection, acquisition, design, development, management, and maintenance of public school lands. These guidelines comprise the official public statement of the board of education and formulate the basis for educational and community program development of the land.

1.2 Selected Application: The development, adoption, and implementation of an educational site policy by a school district is the initial step to ensure educational and community utilization of school owned lands. Without a comprehensive set of site guidelines, school land utilization becomes haphazard, as evidenced in a majority of school districts.

Each component guidelines of a well-designed educational site policy is detailed in this volume and is reflected in the master checklists of Volume III. However, implementation of any or all of these guidelines in isolation will not ensure a conscious, coordinated program of site development. A school site policy which is developed by the educational staff in close conjunction with the community and is publicly affirmed by the district through constant practice will (1) guarantee maximum educational and community utilization of existing school sites, and (2) lead to the maximization of public tax revenue investment through the development of new acquisition criteria for school lands.

1.3 Case Example: The Ann Arbor (Michigan) Board of Education has recently adopted an "Educational Site Policy" which provides the legal framework for optimal use of public school lands as community resources. The Board of Education of this community recognizes that the (1) educational environment is not limited to the confines of school buildings, and that (2) a conscious effort must be made at all existing schoolhouses to increase the educational potential of each school site. The following educational site policy represents exemplary site planning criteria:

I. The sites on which schools are located are fully as important to the educational process as school buildings; each site shall have educational specifications developed for it in the same way that educational specifications are developed for school buildings.

II. Just as building design is entrusted to competent professional architects, so shall site development, design, and selection be entrusted to those who are competent in this field--professional landscape architects/site development educators.

III. Sufficient budget monies shall be allocated for the position of staff landscape architect, consulting service/site development educator.

IV. This staff professional or consulting professional shall be used in consultation with the Board on site selection, and cooperate with the chosen architectural firm in total design of the site, together with the placement of buildings and all auxiliary developments planned for the site. This shall be drawn into the contract with the architectural firm.

V. During the design and construction of buildings on the site, the architects and builders shall be admonished and required to control pollution of the air, water, soils and natural resources of the site, under the supervision of the landscape architect/site educator.

VI. A master file on each school site must be kept at both the building level and in Central Administration and updated annually. This file must include, but not be limited to, the following items:

A. Legal Description
B. Aerial Photograph
C. Soil Map from the Washtenaw County Soil Conservation District

D. Topographical Relief Map
E. Survey Map indicating building and out-building placement

VII. The board of education shall initiate and establish a permanent resource inventory record of each school site consisting of the following site plans and site inventory.

- A. Site Plans
    1. Resource Inventory Site Plan
    2. Site Development Plan
    3. On-Site Technical Assistance Plan
    4. Follow-up Assistance Plan
    5. Comprehensive Master Plan
- B. Site Inventories
    1. Site Analysis
        - a. Slope Analysis-Land Form Topography
          slope categories 0 to 6%, 6 to 12%, 12 to 20%, 20%+
        - b. Vegetation and Wildlife
          primary plant communities
          predominant species
        - c. Drainage Patterns and Surface Water
          primary watersheds
          seasonal and permanent water table
        - d. Soils and Solid Geology
          general surfacial information
            - soil boring data
            - depths to strata
            - underlying rock structure
            - degrees of permeability
        - e. Climate and Erosion Potential
          macro-regional
          micro-local, primarily within the site water and wind
        - f. Environment, Scale, Esthetics Beyond Site Boundaries
          views, nuisance impact, indigenous character in relation to environment and human values
    2. Regional Analysis - Planning Constraints
        - a. Utilities
          location, type, pressures, power capabilities
        - b. Vehicular and Pedestrian Patterns
          major arteries and paths
        - c. Traffic Demands
          existing, proposed, and long-range patterns
        - d. Easements, Rights of Way
          legal inferences
        - e. Zoning
          type, restrictions
        - f. Building Codes
          Township, City, County, State, Federal
        - g. Mineral Rights
          oil and gas rights

h. Water Resources
   quality and type
i. Soil Boring Data
   engineering studies, Soil Conservation Service Maps
j. Land Use
   patterns and projected uses

VIII. To this end, a master plan of all existing sites shall be prepared over the next three years to bring present campuses up to the specifications outlined in the guidelines.

IX. Each principal shall be held accountable for site plans, development, maintenance, and improvement. It is expected that each principal will consult with all available school personnel and community resource persons for improving the school-community site.

X. School District Buildings and Ground Personnel shall assist in the coordination of school site development with building principals, resource personnel, and community groups. They, in turn, should be kept apprised of all improvements on school sites to insure that plantings are not destroyed in normal school site maintenance.

XI. The School District Superintendent shall appoint a series of "Citizens for Community-School Site Committees" for the specific purpose of collecting the necessary comprehensive data for developing a master school site plan for each school which can be implemented over the next decade.

XII. Continuous research data collection shall be conducted by the School District to supplement the "Educational Site Policy Guidelines", especially as it pertains to economic and environmental expenditure decisions that are implemented for site improvements (keeping in mind the first priorities of naturalness and respect for natural processes that preceded man's use of this land).

EDUCATIONAL OUTCOMES

SITE DESIGN CONCEPT 2

Natural Land Resource Inventory: 'educational potential' of land

2.1 Definition: The natural land resource inventory of the school site is prepared by site specialists and constitutes the initial phase for school site development projects. The inventory is a comprehensive written document, including graphic mapping techniques which detail the natural and man-made amenties of the school site. Inclusive within the inventory are the physical planning constraints placed upon the site by law and/or existing resources.

2.2 Selected Application: A variety of resources are available within any school district to provide the expertise necessary to produce a comprehensive natural land resource inventory. Immediately available are these persons directly connected with the schools:

1. board of education members
2. educational professional staff
3. educational nonprofessional staff
4. parents/students/community residents

Community resources are often available through organizations existing in the community:

1. ecology/service clubs
2. historical/geneological societies
3. farm/sportsmen's associations
4. business and professional clubs

In addition, the identification and utilization of local expertise:

1. architects
2. landscape architects
3. surveyors
4. lawyers
5. historians
6. engineers

will tend to increase the quality of the inventory. Finally, governmental agencies are a rich source of information. Among those to consider are:

1. Local
    a. city parks and recreation department
    b. county park authority
    c. local planning commission
    d. engineering/surveying department

2. County
    a. soil conservation district
    b. regional planning commission
    c. drain commission
    d. county extension office

3. State/Federal
    a. State Department of Education
    b. Department of Natural Resources
    c. Federal Energy Administration
    d. United States Department of Agriculture
    e. U.S. Department of the Interior
    f. Bureau of Outdoor Recreation

A "Natural Land Resource Inventory" should include both a site analysis and a study of regional planning constraints. The site analysis should include all natural and man-made amenities on the site having educational potential. Essential components of the Site Analysis are:

1. Slope Analysis-Land Form Topography
    slope categories 0 to 6%, 6 to 12%, 12 to 20%, 20%+

2. Vegetation and Wildlife
    primary plant communities
    predominant species

3. Drainage Patterns and Surface Water
    primary watersheds
    seasonal and permanent water table

4. Soils and Solid Geology
    general surficial information from Soil Conservation Service
        soil boring data
        depths to strata
        underlying rock structure
        degrees of permeability

5. Climate and Erosion Potential
   macro-regional
   micro-local, primarily within the site
   water and wind

6. Environment, Scale, Esthetics Beyond Site Boundaries
   views, nuisance impact, indigenous character in relation to environment and humans

Regional planning constraints should include legal constraints and physical constraints placed upon development by existing conditions. Each of these ten areas need careful study.

1. Utilities
   location, type, pressures, power capabilities

2. Vehicular and Pedestrian Patterns
   major arteries and paths

3. Traffic Demands
   existing and proposed patterns

4. Easements, Rights of Way
   legal inferences

5. Zoning
   type, restrictions

6. Building Codes
   Township, City, County, State, Federal

7. Mineral Rights
   oil and gas rights

8. Water Resources
   quality and type

9. Soil Boring Data
   engineering studies, Soil Conservation Service maps

10. Land Use
    patterns and projected uses

2.3 Case Example: Ingham Intermediate School District (Mason, Michigan) has recently completed a Natural Land Resource Inventory. The Summary Analysis of the 170 acre site as a campus for special education and vocational education is as follows:

The 170 acre site is located in rolling, rural land north of Mason, Michigan. Howell Road on the south and Hagadorn Road on the east are major thoroughfares and provide access to the site. Howell Road carries the greatest volume of traffic due to its intersection with U.S. 127 west of the site. However, neither road rights-of-way have reached their design capacity of upwards of 4,000 vehicles per day. Traffic patterns on the site create some conflict due to the alignment of the major connecting road through the Vocational Education parking lot.

Surrounding land use is largely agricultural. Low density residential development is projected to in-fill on the north and east of the site. The broad Sycamore Creek floodplain on the west buffers the site from probable development near U.S. 127. Rolling acreage to the south of the site is presently for sale and it is assumed that a more intensive use of the land will occur.

Climatologically, no unique circumstances exist on the site which hinder its development. The cold northwest winter storm winds should be a major factor in locating buildings, entrances and drop-off zones.

Natural resources of the site are both subtle and powerful in the influence they will exert on the site's physical and educational development potential.

Soils generally are loams on the uplands and mucks in the floodplain. For a variety of environmental reasons, the floodplain soils and habitats should be preserved. The majority of the relatively "dry" upland soils exhibit properties which question their suitability for development (i.e. seasonal high water table, fair to poor bearing capacity, etc.). However, experience with building on similar soils of the site indicate that these limitations can be overcome or modified to allow for careful development.

Land form and the resultant pattern of surface drainage define zones of the site which are most suitable for preservation or development. The site's resource characteristics are interrelated in such a way that the most serious soils limitations, the most fragile plant communities, the groundwater recharge areas, steepest slopes, etc., are aligned with the surface drainage paths. These paths, in turn, define land units of various acreages which have individual senses of identity and potential for development.

Visually, the site has an inherent rural character somewhat disrupted presently by the urban materials of the existing buildings and the prominence of the unscreened parking lots. The site needs buffering on the north, east and south edges to protect its integrity from possible future adjacent development of an incompatible nature. Elements on the site of visual significance and quality are the "soft" floodplain and protected views to the west, the strength of the sugar maple woods, the verticality and appropriateness of the barn and silos in their agricultural context, the long views to the courthouse steeple in Mason and the broadness and cleanness of the crop fields, especially as they meet the sky when viewed from the lower parts of the site.

Vegetation on the site is rich and varied. Included are natural plant communities adapted to set sites or dry sites; species variation from mature trees to delicate wild flowers; and man-influenced vegetation of large crop fields defined by broken fencerows of mixed species. These varied habitats provide food and cover for a wide range of wildlife species.

In summary, the site's variety of habitats, agricultural heritage, ready accessibility and suitability to accomodate sensitive development provides an environment well suited to its intended purpose as a campus for special and vocational education.

EDUCATIONAL OUTCOMES

SITE DESIGN CONCEPT 3

Interdisciplinary Educational Planning: inter-agency site involvement

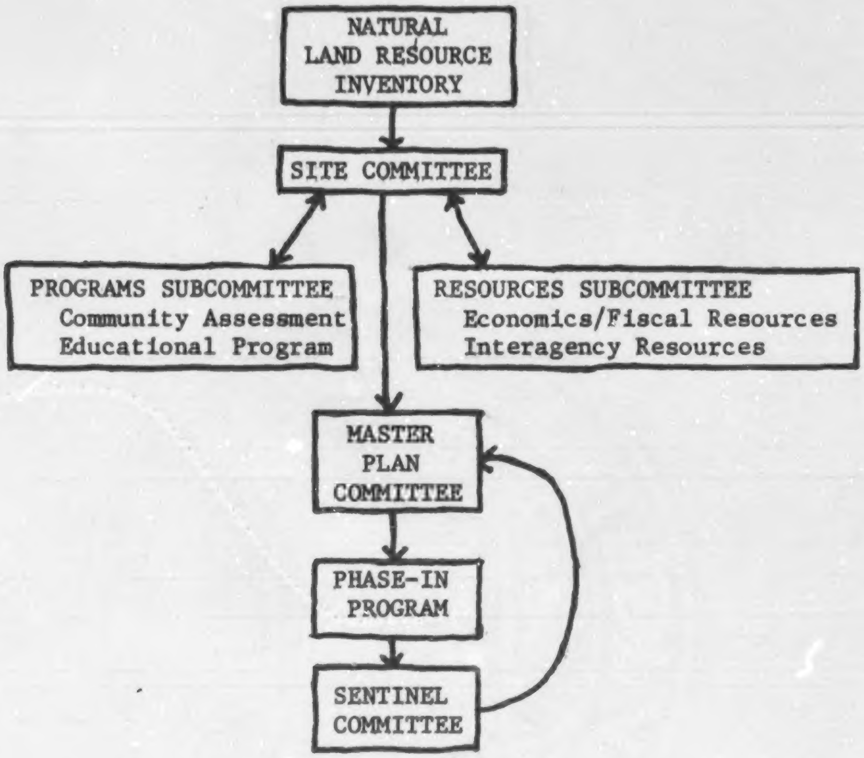
3.1 Definition: Educational site planning assumes interdisciplinary perspective when the services and technological assistance of local, state, and federal agencies and organizations are involved. It is not enough to simply utilize land resource agency expertise. A representative sample of community members must actively participate if there is to be (1) understanding of the interpretations that the economist, sociologist, ecologist, or engineer provide for the site development project and if there is to be (2) political commitment for implementing the master site development plan.

3.2 Selected Application: Educational planning procedures for school site development projects are the prime responsibility of the educational leadership within a school district. In order to achieve comprehensive educational planning, the superintendent of schools assumes responsibility for implementing the following Educational Site Planning Model. (See Process/Procedures)

The "Natural Land Resource Inventory" including planning constraints can be compiled by small teams of professionals. This inventory analysis provides the land capability data necessary for early project determinations.

The selection of the Site Committee is important to the success of the interdisciplinary planning process. The committee, composed of representatives from the subcommittees, represents a cross-section of the community in addition to professional resource experts. The committee works directly with the board of education and superintendent of schools and is divided as indicated by the chart below.

EDUCATIONAL SITE PLANNING MODEL


NATURAL LAND RESOURCE INVENTORY
SITE COMMITTEE
PROGRAMS SUBCOMMITTEE
Community Assessment
Educational Program
RESOURCES SUBCOMMITTEE
Economics/Fiscal Resources
Interagency Resources
MASTER PLAN COMMITTEE
PHASE-IN PROGRAM
SENTINEL COMMITTEE

A brief description of the committees is necessary to define and delineate the responsibilities of each one.

The Site Committee has the prime responsibility for developing the Master Site Plan. This Master Plan will be an amalgamation and synthesis of the recommendations of the Programs and Resources Subcommittees.

The Programs Subcommittees study the needs of the district and make site development recommendations based upon those needs. The number and scope of such committees will depend upon the composite needs of the district. However, two program subcommittees are essential: Community Assessment Committee and Educational Program Committee.

The Community Assessment Committee determines the educational and recreational needs of the total community. Citizens from the community comprise its core. The Committee should be encouraged to involve local land resource personnel.

The Educational Program Committee determines the educational site specifications for the site as related to the existing curriculum. This committee is composed of educational staff members.

Resources Subcommittees are established to analyse the needs and resources available for site development. The number and scope of subcommittees may vary, but two resource subcommittees are essential: Fiscal Resource Committee and Interagency Resource Committee.

The Fiscal Resource Committee identifies financial resources which can be utilized in the development of the school site. Committee members are drawn from the community and school district.

The Interagency Resource Committee is composed of professional representatives of agencies and organizations with land expertise in site development. Members include the school district capital planner, architect and landscape architect, representatives of government agencies such as the county drain commission and the parks and recreation department. These representatives should be drawn from the neighborhood in which the site is located.

Once the subcommittees have completed their study and made recommendations to the Site Plan, the Master Site Plan can now detail existing land resources and the amenity resources; both natural and man-made structures which need to be developed on the site.

The Phase-In Program sets the time constraints for implementing the Master Site Plan while realistically balancing needs and resources. Priorities need to be determined and a time line or sequence constructed with project completion dates established.

The importance of the Sentinel Committee cannot be overstated. Community as well as professional staff involvement in the implementation of the site development program will ensure continued community understanding and political support. It also provides the mechanism for continual revision of the Master Site Plan utilizing community-based and professional staff input.

3.3 Case Example: The Northwest Educational Center Site Facility Project of the Ann Arbor (Michigan) Public Schools envisions the development of the third senior high school site and facility as an interdisciplinary-interagency community project. The over-all goal of the school district is to develop the 118 acre site into an educational land resource which insures for posterity optimal conditions for significant educational outcomes on the land. Equally important, the educational site must also contribute to the open space preservation program for the northwest environs of the City of Ann Arbor.

The "Natural Land Resource Inventory" phase has been completed. Graduate students from the University of Michigan, College of Architecture and Urban Planning, School of Education and School of Natural Resources worked directly with the Capital Planning Department of the Ann Arbor Public Schools to comprehensively detail the northwest site characteristics and the urban and regional environ demography. Additional phases of the project will focus upon the analyses of the adjacent land units: Huron River Watershed, Birdhills Park Development, Wines/Forsythe Site, and the Smokler Land Corporation holdings. These surrounding land resources are designated to be interconnected and will provide pedestrian linkage to an open space system within this land region utilizing the 118 acre Northwest Education Center Site as the focal point.

EDUCATIONAL OUTCOMES

SITE DESIGN CONCEPT 4

Educational Site Specifications: written statements of program requirements

4.1 Definition: The written educational document presented to the architect and/or landscape architect designates the educational program requirements of land. These educational program statements are written by the professional staff to insure that (1) the educational process and instructional program are interrelated and that (2) creative architecture and landscape architecture design is promoted on the site.

4.2 Selected Application: An educational site specification for earth science might be to build a geologic rock wall. Specifications would require that a rock wall 20' X 2' X 4' be constructed as a retaining wall for a science terrace. The wall could be used as a learning environment station. This geologic structure should replicate rock charts found in earth science textbooks. By teaching the gradational nature of rock types within geologic sections of the wall, students can easily visualize this important concept. The specimen rocks should be large, cut and trimmed, but unpolished. A wall might contain the following sections:

1. Igneous Rock: granite, syenite, diorite, gabbro, porphyry, basalt, felsite, andesite
2. Sedimentary Rock: shale, limestone, no fossils, sandstone, fossils, conglomerate, dolomite
3. Metamorphic Rock: marble, slate, gneiss, quartzite, schist
4. Special Rock Formations: ripple marks, joints, faults, concretion, geodes, folds, types of mountain formation

5. Building Stone: commercial polished examples obtained from local monument distributer such as marble, slate, granite, sandstone, limestone.

Students, educational staff, and parents from the Dicken Elementary School, Ann Arbor, Michigan, have constructed a geologic rock wall of indigenous rock material native to the United States. Rock specimens were collected by the students throughout the United States during summer vacation and brought to the school site in the fall. The geologic rock wall has been photographed using 35 mm color slide film for indoor instructional use. The constructed geologic rock wall serves as a learning field station during the school year. This geologic rock wall is part of a ten year phase in the Master School Site Development Plan for increasing the educational potential of the land.

4.3 Case Example: Educational site specifications were written to solve several problems at the Perry Middle School in Grand Blanc, Michigan. Specifications were developed for the enhancement of the east-northeast land frontage adjacent to Perry Middle School along South Saginaw Street. The frontage site involved a piece of land 102 feet 4 inches by 34 feet 8 inches.

Three problems existed. Soil from the slope was gradually eroding onto the sidewalk and into the street. This left the secondary roots of several of the maples exposed. The erosion also did nothing to enhance the beauty of the frontage. The second problem involved student traffic down the slope and across the street, rather than crossing by the light adjacent to the northeast corner of the school. The third problem involved the loud noise from the heavy traffic on Saginaw Street.

There were two solutions to these problems. One solution was to construct a large walled sound barrier in front of the school parallel to Saginaw Street between the trees and the school. This might have prevented the noise from interfering with classes and impeded student traffic. Such a sound barrier, however, would not solve the erosion problem, and would not enhance the beauty of the site. The second solution was determined to be more desirable for implementation. It involved constructing a railroad tie, two-tiered bed to prevent erosion, and evergreen shield to discourage random student traffic across Saginaw Street, and two raised flower beds between the shield and the school to aid in muffling the street noise. To facilitate this construction, the following educational site specifications were written.

I. The first part of the proposed solution was to build a two-tiered railroad tie wall with a flower bed at the lower level. This wall would run the entire length of the 102 feet 4 inch frontage. Each tier would be four ties high (22-24 inches); together both tiers would be 44 inches high. However, with the bottom tie of the lower tier placed partially below the sidewalk level at the bottom of the slope, the overall height of the wall would be closer to 3½ feet.

   The second tier of four railroad ties would be recessed toward the slope, leaving a flower bed running the length of the frontage on the lower tier. However, to avoid a dull, monotonous plain wall, the second tier wall should be recessed one foot between the areas directly in front of the six maple trees. The flower bed in front of the six trees should therefore be 2½ feet deep, 3 feet deep counting the six-inch wide railroad ties. In the recessed areas between the six trees, the flower bed should be 3½ feet deep, 4 feet deep counting the six-inch wide railroad ties. These recessed areas should create an undulating effect in the tie wall of the upper tier.

   Each tier should be four ties high. The ties should be placed one on top of the other in an interlocking fashion. Each tie should also be placed slightly inside the edge of the tie below it, tapering off ever so slightly toward the trees. The ties should be fastened together with carriage belts at points where they interlock. This form of construction will prevent buckling of the wall by frost.

II. The second part of the proposed solution was to plant an evergreen shield, hedge, along the top of the slope above the second tier, between the six large maple trees. The shield should consist of 34 blue pfitzer junipers, planted approximately three feet apart. The shrub should grow to four feet high and five feet wide. Pruning the shrub to a smaller size should promote density and secondary branch growth. Therefore, the three foot distance between each bush is recommended. This shield, after a year or two's growth, will provide the frontage with a dense barrier, muffling some street noise and discouraging traffic across Saginaw Street.

III. The third part of the proposed solution was to construct two raised flower beds between the evergreen shield and the building. These beds would provide a secondary sound barrier, particularly for the basement floor of the building. The beds, when planted, will enhance the beauty of the site in general. They may also serve the purpose of a natural plant laboratory for the school's science program.

EDUCATIONAL OUTCOMES

SITE DESIGN CONCEPT 5

Lands for Learning: outdoor classrooms on school sites

5.1 Definition: Natural areas of school sites or adjoining school owned lands become outdoor classrooms when utilized for instructional purposes. The degree of formal development of each outdoor classroom varies according to the demands of the educational program. Instructional areas range from wood lots, nature trails, school farms and forests, to scattered stump fields, natural amphitheatres, and formal landscaping.

5.2 Selected Application: School sites are rich resources of water, soil, minerals, plants and animals. These public lands are used best when children become actively involved in well-planned projects that ensure active mental and physical involvement.

Even small acreage sites contain the potential for such projects. Children can learn about the problem of soil erosion on almost any play surface. Seldom are the rills and cracks in the playground seen as the specific result of the actions of people. Yet, to work through the steps that lead to solving the erosion problem yields a valuable learning experience. To stir up the soil, to condition the soil with an ingredient as available as coffee grounds, to plant the soil with clover seed so the soil nutrients are replaced and the earth is protected from wind and water erosion, and to understand why all these steps are necessary is a learning experience a youngster can use eventually whether he tends a handkerchief-sized lawn in Detroit or a ranch in Wyoming.

Public educational policy with well-conceived outdoor classroom directives will ensure the optimum use of the site as a land for learning. Educational policy statements should include references to:

1. educational specifications for the site as a whole
2. educational specifications for each outdoor classroom on the site
3. input from interdisciplinary personnel
4. sufficient monies
5. permanent resource inventory records
6. continued annual review or evaluation procedures
7. pollution control standards
8. maintenance of sites and outdoor classrooms
9. development of other sites in the system
10. allocation of monies for total system site implementation.

5.3 Case Example: Most school districts in metropolitan areas purchase school sites that allot sufficient space only for the educational facilities and the parking lots. A few have developed long-range planning. Plymouth (Michigan) Community School District, a 54 square mile district rapidly becoming a part of the urban-metropolitan Detroit environ has demonstrated its long range planning through the purchase of sites which allow for learning on the natural landscape terrain.

The Plymouth Centennial Educational Parks exemplifies this planning and purchase policy. The 305 acre site contains two senior high schools. Student enrollment in the shared educational facilities approaches 4,000, permitting a broad educational program offering. The unique outdoor classroom on this site is the operational farm, with a resident farm manager who is responsible for a K-12 program in rural life and ecology. The farm, complete with silo, barns, farm animals and a three-acre nature pond for aquatic life and water fowl study, provides related experiences for youngsters on the site. This land resource forms the focal point for educational experiences related to ecological awareness and a quality environment for residents within the Plymouth community.

EDUCATIONAL OUTCOMES

SITE DESIGN CONCEPT 6

Children's Play Environs: design for 'optimal potential growth'

6.1 Definition: The school site environment which generates optimal potential growth conditions for younger children is best achieved by designing individualized play areas. These areas should be based upon both informal and formal play related activities. These play environments allow for a variety of physical and psychological responses from children based upon age level grouping. Play space environs should provide stimulating, responsive, creative experiences for children.

6.2 Selected Application: Research derived from anthropology and psychology studies reveals that (1) play has been a constant cultural pattern throughout human existence and that (2) play provides deep and prolonged positive experiences for human beings. Environmental and educational research at the University of Michigan, by Dr. William B. Stapp, involved elementary school age youngsters from urban, suburban, and rural environments throughout the midwest. The research revealed that children desire five major features on school sites: (1) a large play space environ, (2) water resources on the site, (3) significant trees and variety of vegetation, (4) natural habitat for attracting wildlife to the site, and (5) variety of topographical terrain features.

School playground designers can simulate the psychological feelings engendered by nature's elements. These elements in combination with the following built/environment criteria for children's playground environs can promote positive play experiences for children.

DESIGN FOR CHILDREN'S PLAY ENVIRONS

NATURAL SITE DESIGN FEATURES

1. Water Resources: construct a water reservoir pond, a grassed waterway, or a simulated waterfall environment using schoolhouse rooftop runoff water. Locate a sand knoll adjacent to the water resource.

2. Variety of Terrain: build an earth hill, a contour berm, or small mounds of earth. The design should be based upon formal/informal play activities. Scale of earth structures should be appropriate to client/user.

3. Wildlife Sanctuary: create micro-habitats which attract birds and small animals to the site. Build wildlife dens for children's investigation, study and imagination.

4. Trees and Vegetation: plant a variety of deciduous and coniferous tree specimens. Trees and vegetation zones provide intimate spaces for children and create territoriality space. Acoustics and esthetics for sensory relief are enhanced.

ARCHITECTURAL SITE DESIGN ELEMENTS

1. Space Environs: design playgrounds for spatial organization. All children need spatial territoriality. Children desire a large playground area with intimate spaces accentuated within total site. Integrate play equipment, play space, natural vegetation within a master site plan.

2. Space Articulation: separate and buffer play area zones for acoustical sound control, solar glare reduction, wind current moderation, precipitation control by utilizing natural vegetation and man-made structures.

3. Space Use: include seating spaces using natural materials which reinforces psychological response values for both adults and children. Scale of benches should conform to client/user.

4. Color Areas: use color-coded resilient bitumins on all hard surfaced play areas. Color provides variety of visual contrast for positive psychological response.

5. Color Structures: maintain play equipment in brightly colored schemes or natural blending hues. These colors

should form a focal point of play areas by unifying a series of man-built structures.

6. Scale: design play equipment and site structures for a variety of formal and informal activities. The scale of design for an area should conform with the client/user. Miniaturization of play equipment and structures is essential for small children.

SAFETY AND PEDESTRIAN TRAFFIC CIRCULATION

1. Safety Zones: spatial organization contributes to safety for children. Use man-made berms, vegetative plantings for pedestrian traffic articulators. Design pedestrian circulation patterns to flow around play space zones.

2. Safety Location: locate all exterior play activity areas away from classrooms and near multi-purpose gymnasium space or within interior courtyards.

3. Safety Equipment: design playgrounds with well-constructed play apparatus. Treat surfaces under high equipment with soft materials (wood chips).

COMMUNITY DESIGN CONTRIBUTIONS

1. Neighborhood Demography: all design is related to the clients who utilize the play space. Neighborhood socio-economic, ethnic, cultural data is absolutely essential for successful site design utilization.

2. Neighborhood Involvement: residents of the neighborhood should contribute to the total design process of the playground development. Residents should construct certain apparatus, select design features, and reinforce neighborhood values.

6.3 Case Example: In a research project conducted by the Institute of Advanced Studies in Manchester, England, it was determined that (1) outdoor areas and play environs are often considered appendages rather than learning space, (2) these areas rarely contribute positively to the environment of the neighborhood, and (3) these areas seldom reflect the social and recreational needs of the child or of the community as a whole.

As a result of this Planning the School Site Research Project it was decided that ideas, information, opinions and advice had come from all those concerned with the design or use of the school site except the large majority of school users, the children themselves. It was therefore considered a good idea to give the "child client" a chance to speak. The project enlisted the help of "Watch", a children's environmental group, to make sure that voluntary and imaginative responses would be elicited.

Among the facilities suggested were:

1. adventure playground
2. animal runs
3. aviary
4. banks and slopes
5. benches
6. bicycle sheds
7. biology corner
8. bird hides
9. camping field
10. car parks away from play areas
11. climbing frames
12. cycle track
13. duck pond
14. field
15. farming corner
16. fish pond
17. flowers
18. fountain
19. garden for relaxation
20. garden plots for growing things
21. grass area suitable for outdoor lessons
22. greenhouse
23. grass stage
24. hills
25. lake frozen in winter for skating
26. lawn
27. litter bins
28. lunch area
29. mountain climbing
30. nature reserve
31. observation tower
32. orchard
33. patios
34. pet house
35. playground
36. pond
37. quiet place for study
38. rough grassland
39. running track

40. stream
41. swimming pool
42. swings
43. trees for climbing
44. tree houses
45. water area for scientific experiments
46. wild area
47. woods

As a result of these suggestions, demonstration schools were designed by a multi-disciplinary team. User requirements, for the demonstration schools, were drawn up by a specialist committee and were based on concepts resulting from the research. The user requirements were not limited to outdoor areas alone but integrated indoor and outdoor space.

The research portion of the project took two-and-a-half years. Construction of the demonstration schools began in 1975. The final stage of the project will be an evaluation of the demonstration schools after a period of use.

EDUCATIONAL OUTCOMES

SITE DESIGN CONCEPT 7

Social Memory of Land: land holds vestiges of man's occupation

7.1 Definition: Vestiges of man's occupation include material objects found on or in the land and the records of its purchase, sale, and use.

7.2 Selected Application: Land everywhere holds the vestiges of man's occupation. The abstract for the deed to the land on which any school is built contains a record of ownership and implies a history of land use. The Indians who used the land may not be mentioned in the abstract, but they have left tools and weapons in their mounds. The pioneer fold who came to homestead is recalled through the remnants of hardwood-handled scythes and broad-axes. A city lot shows shards of blue glass and porcelain from a Mason jar and snips of barbed wire work up through the grass to say that this land was once a field devoted to cattle or crops. Researching an abstract can be a lively project for a community adult education group or for a social studies class.

In a similar manner, other applications for school curriculum might be employed to develop an understanding and respect for what preceded the present use of the land. Interest invested in historical sites and remanents are likely to induce a myriad of questions and activities.

The gathering and studying of artifacts indigenous to an epoch and/or place can involve not only school curriculum but community and local government agencies. Together these groups can work to maintain and enhance a mutually shared site. They can share in its pleasures as well as reap the benefits of increased property value and community stability. Social memory of land can be a binding force.

7.3 Case Example: One of the best examples of social memory of land is the Coblestone Farm Association's restoration of the Ticknor-Campbell cobblestone farmhouse on Packard Road in Ann Arbor, Michigan. The cobblestone farm is the remaining historical contact on the Buhr Park school-park site developed by the Ann Arbor Public Schools and the City of Ann Arbor.

The Cobblestone Farm Association has traced the history of the original 183 acre farm back to 1835 and its original owner, Hemon Ticknor, to the acquisition of the remaining 4.5 acres by the City of Ann Arbor from George and Mary Campbell in 1972. The Association has analyzed architectural aspects of the construction of the farmhouse. It was built by Stephen Mills, a local stone mason who had learned his trade in western New York where cobblestone architecture was the height of style. The abundance of indigenous stones perhaps determined the unusual building material.

Since early 1974 this citizens group has been active in providing the research, fund-raising, and planning for the restoration of the Ticknor-Campbell House and the surrounding grounds which make up Cobblestone Farm. Funds raised by the Association have been used to repair the roof, heating system, and electrical wiring. The City of Ann Arbor has been involved by connecting sewer and water facilities. This project will culminate during the later part of 1976 in a working pioneer farm museum.

Site Resources

I. Select Publications

II. Bulletins, Guides, Reports, Papers, Manuscripts

III. Research Studies

Site Resources

I. Select Publications

"School Site Decisions and Dollars, Dollar Consequences of School Site Planning Decisions," ERIC Research in Education. Eugene, Oregon, 1974. (ED 085 880). This article discusses the justification of the necessary capital investment expenditures to develop the public school site into a community land asset.

"School Site Decisions And Dollars," Karl W. Grube. Eugene, Oregon, 1974. ERIC Research in Education. (ED 087 096). A three (3) volume manuscript including: (1) the school site as a land resource, (2) school board policy as related to economic alternatives for open space planning, (3) establishing outdoor classroom on school sites as public policy.

"Economic Planning And Design Decisions," Karl W. Grube. Environment Education Report, Washington, D.C. 1975. A summary of ten (10) major findings of the economic impact of school site development upon surrounding residential property value.

"Site Development: An Investment, Not An Expense," Karl W. Grube. Nation's Schools and Colleges, Chicago, 1975. A case example of the economic impact of an ecologically developed school site upon surrounding residential property values.

"The Economic Influences of Elementary School Sites on Residential Property Tax Revenue in Selected Urban Neighborhoods," Karl W. Grube. ERIC Resources in Education. Eugene, Oregon, 1975. (ED 096 746). This study develops research criteria and statistically valid analyses, measures the economic influences of well-developed and underdeveloped school sites, and makes estimates of the potential additional property tax revenues yields for residential housing units of the well-developed school sites.

"School Site And A New Aerial Photogrammetric Technique," Karl W. Grube & Barbara E. Sanders. Council of Educational Facility Planners, International, Columbus, 1976. The article depicts a new contour mapping system using convential aircraft and photogrammetry that allows educational agencies and institutions the opportunity to produce high quality mapping at low dollar costs.

ABSTRACT

THE ECONOMIC INFLUENCES OF ELEMENTARY SCHOOL SITES ON RESIDENTIAL PROPERTY TAX REVENUE IN SELECTED URBAN NEIGHBORHOODS

by

Karl William Grube

Chairman: Frederick W. Bertolaet

The purposes of this study were: (1) to develop research criteria and statistically valid analyses; (2) to measure the economic influences of well-developed and undeveloped elementary school sites, large open space and small, limited space, on the market sale prices of comparable single-family residential housing units in matched pairs of urban neighborhoods; and (3) to make estimates of the potential additional property tax revenue yields for residential housing units of the well-developed school sites based on the 1972 property tax millage rates applicable in the subject population neighborhoods.

Procedures for Determining Comparable Samples

In developing the research criteria for this study, the writer evaluated 75 (seventy-five) Michigan school districts and their respective elementary school site neighborhoods to insure comparable sample populations. Elementary school site neighborhoods were selected for detailed data-gathering and statistical analyses and included the comparable characteristics of: (1) relative land acreage sizes; (2) degrees of site development; (3) types of schoolhouse construction; (4) matched single-family residential housing units; and (5) similar socio-economic stratification within subject neighborhoods.

The study selected matched pairs of elementary school site neighborhoods in the school districts of Dearborn and Lansing, Michigan. Market sale price histories of the subject population, 1224 (one thousand two hundred twenty-four) were obtained for single-family residential housing units for five, large, open space elementary school site neighborhoods and for five, comparable small, limited space elementary school site neighborhoods. Pertinent market sales data, building and site data, and neighborhood profile data which occurred during the period from 1952 through 1971 were collected and statistically analyzed.

The primary sources of elementary school building and site data were obtained from the official records of the Michigan Department of

Education, School Plant Planning Section and from the records of the boards of education of the subject school districts.

The primary sources of data for the determination of neighborhood profile characteristics of comparable neighborhoods were obtained from the 1970 United States Census Data, the official records of City Treasurers of Dearborn and Lansing, and from the Dearborn and Lansing City Engineering offices.

The primary sources of market sales data for the subject population were obtained from the records of Boards of Realtors of the Dearborn and of the Lansing Associations and from the public records of the Register of Deeds Offices of Wayne and of Ingham counties, the Burton Abstract and Title Insurance Company and the Lawyers Title and Trust Company of those respective school districts.

Findings

The study tested and rejected the following four null hypotheses.

H_0 = There is no significant difference in the last sale price of residential housing as adjusted for the covariates of the first sale price, the number of years between sales, and the number of streets crossed for large, open space and for small, limited space elementary school sites.

H_0 = There is no significant difference between the relationship of the number of streets crossed and the first sale price for large, open space and for small, limited space elementary school sites.

H_0 = There is no significant difference between the relationship of the number of streets crossed and the last sale price for large, open space and for small, limited space elementary school sites.

H_0 = There is no significant difference between the relationship of the projected potential additional property tax revenue yield and the last sale price of residential housing as adjusted for the covariates of the first sale price, the number of years between sales, and the number of streets crossed for large, open space and for small, limited space elementary school sites.

On the basis of the statistical analyses of the data, the following conclusions were reached:

1. The combination of: educational, community, and landscape developed acreage; natural or manmade amenities; good site development practices; good site design; and, site maintenance, are all influential in contributing to higher market sale prices of residential housing surrounding the subject elementary school sites.
2. The enlargement and conversion of a formerly small, limited space elementary school site into the site criteria standards of a large, open space elementary school site increased the market sale prices dramatically (one sample site); thus, the most recent market sale prices in this neighborhood equaled those recorded around the comparable, large, open space elementary school site.
3. The size of the land acreage of large, open space elementary school sites is related significantly to the higher market sale prices recorded on residential housing units sold in the subject neighborhoods.
4. The size of the land acreage of large, open space elementary school sites is related significantly to the higher market sale prices recorded on residential housing units sold in the subject neighborhoods.

5. When developed parkland is the major portion of an elementary school site, these parklands influence positively the market sale prices of nearby residential housing.

6. The land acreage size and the degrees of school site development of the elementary school sites surveyed in this investigation exerted positive and negative influences on the recorded market sale prices of residential housing units as far away as five street crossings from the site.

7. The residential housing units located in close proximity to large, open space elementary school sites produced higher market sale prices than did comparable residential housing located at the same proximity to small, limited space elementary school sites.

8. The residential housing units that are located one, two, and three street crossings away from large, open space elementary school sites are selling for higher market sale prices than similar residential housing units located farther than the site.

9. Higher market sale prices were recorded for residential housing units located near well-developed small, limited space elementary school sites as compared to similar residential housing units located four or more street crossings away from the subject site.

10. The projected potential additional property tax revenue yields from residential housing units surrounding large, open space elementary school sites could be sufficient to pay the additional investment for open space acreage, site development, and site maintenance when collected over a thirty-year period.

Site Resources

II. BULLETINS, GUIDES, REPORTS, PAPERS, MANUSCRIPTS

1. Bruning, Walter F., The School Site - Its Selection, Analysis, Development, and Maintenance. Jacobsen Manufacturing Company, Racine, Wisconsin. February 1966, 30 pp.

A manuscript prepared for the American Association of School Administrators Annual Convention. Information given concerns (1) the master plan, (2) the search for the site, (3) alternate sites, (4) aids used in site selection, (5) preliminary site studies, (6) efficient grounds, (7) the components of the site, (8) landscape materials, (9) ground maintenance, (10) road surface materials, (11) curbing materials, (12) handrails, (13) exterior steps, (14) fence materials, (15) exterior lighting materials, (16) developing lawns, (17) plant materials, (18) maintenance personnel, and (19) a checklist of timesaving tips. (H.E.J.)

2. Campus Aesthetics (College Management's Portfolio of Building Ideas), Management Publishing Group, College Management, February 1967, pp. 53-56.

A college is an atmosphere created in large part by buildings. Plazas and courtyards bring large campuses down to human scale. Five ways in which a campus can be made more beautiful or interesting through architectural care are: (1) a small courtyard outside the University of Denver Law Center, (2) three academic buildings planned as separate structural sculptures for the State University of New York at Buffalo, (3) the mall of Lorain County Community College, Lorain, Ohio, (4) the courtyard at Chicago Teacher's College North, and (5) a courtyard at Florida Presbyterian College in St. Petersburg.

3. Chase, William., School Site Selection and Utilization. The American Institute of Architects, 1735 New York Avenue N.W., Washington, D.C. March 1965, 5 pp.

The site is being increasingly recognized as just as much of the total school plant as the building and equipment. Effective utilization of the site is equally important. This depends on (1) a well-defined statement of educational needs; (2) selection and acquisition of a site to accommodate those needs; and (3) development of the site to facilitate efficient and effective operation of the program. Criteria for site selection include (1) health and safety, which relate to pleasing and desirable neighborhood, free from excessive noises, smoke, dust, odors, and traffic, (2) suitability or ability to accommodate isolated areas for preschool, free play, or low organization games; areas for handicrafts and quiet activities; areas for field games for both boys and girls; areas for adults; areas for playground apparatus; multiple-use paved areas for court games, etc.; science and nature study areas; gardening space; and landscaped areas for site beautification. Site location should relate to distance pupils walk to school; for elementary this is three-fourths of a mile, for junior high one and one-half miles, and for senior high, two miles. The size of site depends on organization, educational activities, building design, anticipated enrollment, community activities, driveways, and future expansion. A table of site size ranges from 3.43 acres for an elementary school of 120 to 12.11 acres for 810 pupils. Cooperation between and among various school and community groups, and the processes of educational planning and architectural design are just as important in site planning as in building planning. (J.H.H.)

4. Community College in Urban Settings, School Planning Laboratory, Stanford University, Stanford, California. December 1963, 20 pp.

A booklet based upon the deliberations of a two-day work conference of the Community College Planning Center of Stanford University, December 19 and 20, 1963. Architects, urban planners, community college presidents, and educational theorists studied the question: "Where should a community junior college campus be located - in the suburbs, with inexpensive land and automobile accessibility, or in the heart of the city near the heaviest population concentration?" The booklet describes the significance of urban life in the society, shows how community college might share that significance and includes aids, sketches, and suggestions for planners contemplating an urban setting for colleges. It is divided into the following major headings: (1) The Nature of Urban Society; (2) Educational Change; (3) Location of Colleges; (4) Implementive Devices. A series of sketches suggesting growth patterns and new concepts of college planning in urban areas brought forth unique ideas on vertical, horizontal, and non-contiguous expansions; waterfront sites; afloat, ashore and on fill in shallow water; and multi-use of property: under offices, under apartments, over shopping centers, over parking areas, and over expressways. The conclusion reached by the conference was "The community college is faced with the duty, the challenge, and the opportunity to revitalize the economy with productive urban wage earners and to revitalize each individual with a sense of human worth and dignity." (M.W.B.)

5. Community School Site, The. NDEA Title 11, Bulletin No. 314, Michigan Department of Education, Lansing, Michigan. 1965, 25 pp.

A bulletin to provide teachers, administrators, and architects with some insight into the creative development and use of the school site as a laboratory for learning. An outline for site planning and use is given. Developing landscape features to fit the school's curriculum is discussed. (H.E.J.)

6. Corde Corporation, A Report on the Education Park. Corde Corporation, 1968, 94 pp.

The evolution of the education park is traced, and the present park concept discussed. The park concept is then applied to actual conditions in Philadelphia, New York, and Baltimore. Many of those conditions are typical of those existing in other large urban areas. Along with delineating the advantages and disadvantages of the park for the three cities, prototype park designs are presented for

Philadelphia, a linear city is proposed for New York, and park plans are considered for Baltimore, with diagramatic representations for each city. An annotated bibliography of books and articles concerning education parks is included.

7. Council of Educational Facility Planners, *Educational Facilities in Urban Settings*. CEFP, 1976, 66 pp.

Major addresses concerning educational facilities in urban settings, which were presented at the 1967 meeting of the Council of Educational Facility Planners. The presentations set forth much of the contemporary thinking and planning as to how educational facilities can be developed to help resolve the vastly complicated negative situation currently characterizing urban environments.

8. Darby, F.C., *School Site Selection*, 1956 Annual Proceedings, Association of School Business Officials, Chicago, Illinois. 7 pp.

Lists steps in obtaining sites: (1) determining need, (2) designation of area, (3) locating property, and (4) recommending site to school board. Various methods for acquiring sites include: (1) realtors, (2) donations, (3) site condemnation, (4) expanding, and (5) price determination. (H.H.C.)

9. Department of Education, *Planning Together for Better School Buildings*, Bulletin Number 412 (Rev.), The Department, Lansing, Michigan: 1970.

A bulletin published by the State Department of Education to assist school officials, boards of education, and communities in the planning process of schoolhouse construction and to encourage good school building design. Chapter IV is devoted to the school site and encompasses the areas of site selection, site size, physical properties of the site, site development, service areas of the site, site acquisition, and the development of school grounds for education, recreational, and community use.

10. Department of the Interior, Bureau of Outdoor Recreation, *Federal Out-Door Recreation Programs and Recreation-Related Environmental Programs*. Superintendent of Documents, U.S. Government Printing Office, 1970.

This is a first revision of Federal Outdoor Recreation Programs, which updates information first provided in May 1968 by the Bureau of Outdoor Recreation in cooperation with other Federal agencies.

Programs described in this publication broadly reflect the scope of federal involvement in outdoor recreation and related environmental efforts. The volume should serve as a convenient reference source to help interested persons locate federal programs that will assist them in providing additional outdoor recreation opportunities in quality environments.

11. Gardner, Dwayne E., Charles E. Trotter, and Sherry D. Levy, Federal Assistance for Educational Planning, Acquiring and Developing Sites and Constructing Facilities. Department of Health, Education and Welfare, 44pp.

A guide to federal financial assistance programs. The programs are identified with the enabling legislation, along with addresses of federal agency offices in all areas of the country responsible for their administration. The booklet is divided into three parts according to the type of federal program: (1) educational planning, (2) acquisition and development of sites for educational facilities, and (3) construction of educational facilities.

12. Grube, Karl W., "The Financial Effect of School Sites as Sources of Urban Open Space Upon Residential Property Valuations", A paper presented to the Michigan Conference of Professors of Educational Administration, Battle Creek, Michigan, April 26, 1971 (mimeographed)

The paper focuses upon the potential of open space school sites generating additional property tax revenue by enhancing the marked value of adjoining residential homesteads. Research techniques and procedures were presented regarding the interrelationship of urban residential property values and urban open space school sites, concentrating upon open space school sites as a public resource for the self-financing of open space. The study is focusing upon homogeneous residential properties and identical blue-print school buildings as related to the self-financing of urban open space.

13. Guide for Planning of School Buildings and Sites in Minnesota: School Plant Planning. Minnesota Department of Education, State Department of Administration, St. Paul, Minnesota. 1966, 207 pp.

A detailed manual composed of three parts. Part one is concerned with state and local responsibilities in school plant planning and procedures for planning and constructing school building. Part two is concerned with the selection of school site and site development, school instructional facilities for both elementary and secondary schools, central and auxiliary facilities, and service facilities. Part three is concerned with fire and life safety, structional design, sound control, lighting and fenestration, plumbing design, sanitary fixtures and trim, heating and ventilation. Several tables, formulae, and standards are given. (H.E.J.)

14. Jones, Donald A., School Site Selection. 1956 Annual Proceedings, Association of School Business Officials, Chicago, Illinois. 12 pp.

Report on considerations for determining and selecting school sites. Site size, shape, accessibility, topography, and eminent domain are given attention. Suggestions for securing appraisal and appraiser's reports are summarized. (H.H.C.)

15. Kansas State Department of Public Instruction, School Sites, Selection, and Development. State Department of Public Instruc-

tion, Topeka, Kansas. 1966, 20 pp.

Criteria for site selection and development are listed. Trial analysis, desirable acreage, suitability of construction, site development concerning economy of construction, operation and maintenance, parking space, safety, outdoor activities, and interscholastic athletics are topics covered. Score sheets for rating proposed school sites and table for suggested space allotments for physical education are provided. (H.H.C.)

16. King, Jonathan, The School in the City: A New Look. Building Research Institute, 1725 Desales St. N.W., Washington, D.C. 1962, 4 pp.

City schools generally copy the architecture of schools in the suburbs and do not utilize space in an economical manner. This paper expressed the view that the problems of central city schools are unique and require different solutions. Joint occupancy is suggested as one solution to this problem. Schools sharing physical facilities with other users, such as offices and apartments, are described. (H.H.C.)

17. Minear, Leon P., Oregon Community Colleges, Policies and Procedures Governing State Assistance Program for Construction of Facilities. Oregon State Department of Education, 1967, 41 pp.

Policies, regulations, procedures, and criteria adapted from the rules and regulations of the Oregon State Department of Education to assist school districts in producing master plans for institutional development. These policies and procedures governing the State Assistance Programs are specifically related to the construction of facilities for Oregon's community colleges. It includes: (1) a policy statement of the responsibilities of the Board of Education, (2) the regulations for funding a community college project, and (3) the administrative procedures for community college construction. The sections on procedures contain an outline for developing utilization studies and guidelines for space standards. The six appendices include sections on approving a proposed site, development of a long-range master plan, the preparation of educational specifications, and the forms required for State assistance.

18. NCSC Guide for Planning School Plants. National Council on Schoolhouse Construction, Michigan State University, East Lansing, Michigan. 1964, 164 pp.

A guide consisting of five major sections: (1) Planning and Programming the Educational Plant, (2) Spaces and Equipment for Learning, (3) Non-instructional Plant Facilities, (4) Balanced Conditioning of Spaces, and (5) Principles of Economy and Planning Resources. It is oriented toward the identification of planning principles rather than detailed instructions. The importance of planning and research is emphasized throughout. Planning roles and techniques are identified and described. Special attention is given to the sonic, thermal, and visual environments and to spatial, aesthetic, and safety factors. Consideration is given to (1) site, (2) instructional spaces, both general purpose and specialized in nature, (3) spaces which serve functions auxiliary to the direct instructional process, and (4) noninstructional facilities and systems. An unusual feature is a section concerning available educational plant planning resources. (C.S.B.)

19. North Carolina State Department of Public Instruction, Property Accounting Bulletin for North Carolina Public Schools (Revised 1966). The State Department, Division of School Planning.

A guide for local school systems in North Carolina to use in property accounting. The bulletin describes the need for, defines and delineates the system and procedures for property accounting. A full explanation is given of how local officials may use the North Carolina system and procedures in conjunction with a handbook published by the U.S. Department of Health, Education, and Welfare (property accounting for local and state school systems). Examples of all diagrams and forms to be used in reporting property accounting are given and fully explained.

20. Pawley, Eric, AIA School Plant Studies (A Selection, 1952-1962). American Institute of Architects, 1966, 160 pp.

A collection of 40 articles discusses various aspects of school planning problems. Those on preliminary phases review: (1) architect selection, (2) development of educational programs, and (3) school costs. Architecturally-oriented articles cover: (1) construction and structural types, (2) standard school plans, (3) flexibility, (4) prefabrication, (5) safety, and (6) maintenance. Specific school types discussed are: (1) small schools, (2) preschool buildings, (3) urban schools. Environmental control is reviewed in terms of (1) orientation, (2) natural ventilation, (3) lighting, (4) color, (5) visual environment, and (6) acoustics. Conceptual articles cover topics of new ideas and quality, while topics such as casework, teaching equipment, kitchens, and auditoriums are reviewed in more specific terms.

21. Pennsylvania State Department of Public Instruction, Guide Specifications for Property (Topographic and Utilities Survey). The State Department. February 1966, 7 pp.

A form to assist architects with various surveys: general specifications include personnel involved, work required, and format of report. A list of information required is included. Specifications for boring procedures include equipment needs, emergency procedures, and general methods of operation.

22. Pennsylvania Department of Public Instruction, Procedure, Principles, and Criteria for Use in Selection of School Sites. Commonwealth of Pennsylvania, Harrisburg, Pennsylvania, 4 pp.

Criteria include: (1) location, (2) adequacy, and (3) physical characteristics of the site. Within each area recommendations are summarized. (H.H.C.)

23. Pennsylvania State Department of Public Instruction, Procedure for Requesting Approval of School Building Projects. The State Department. 1967, 110 pp.

A set of procedures, guidelines, and forms used by the State of Pennsylvania Department of Public Instruction for planning school building projects. The set ranges from project applications to final costs and reimbursements, and includes architectural elements, component systems, equipment evaluation, inspections and site selection.

24. Perry, C.L., School Site Selection. 1956 Annual Proceedings, Association of School Business Officials, Chicago, Illinois. 6 pp.

Report on practices used in Caddo Parish, Louisiana. Areas covered include (1) enrollment data and projection, (2) determination of site location and conditions determining location, (3) negotiations for site purchase, and (4) publicity on site location. (H.H.C.)

25. Planning the Secondary School Plant. Utah State Board of Education, 223 State Capitol, Salt Lake City, Utah. 94 pp.

Presents procedures for planning secondary school plants beginning with the needs of adolescents and progresses to the development of the school building spaces needed to house an educational program designed to meet these needs. Special attention is given to the Utah program of studies for junior and senior high schools, long-range planning, site problems, space organization, and environmental controls. The building spaces designed to accomodate the different subjects are discussed with attention being given to size, location, function, furniture, and equipment. Building spaces discussed include offices, the administrative suite, and facilities for the faculty, guidance, student rooms, industrial art shops, vocational agriculture shops, physical education facilities, the library, the auditorium, connecting spaces, and student commons are described in detail. (E.J.M.)

26. Radolovich, Michael L., Incorporating Educational Facilities in Buildings with Other Occupancy. Building Research Institute, 1725 Desales Street N.W., Washington, D.C. 1962, 5 pp.

It is no longer practical to place an urban school alone on isolated lots, thereby violating the principles of economy and city planning. This paper reports on two possible alternatives to traditional school construction; the combination of a kindergarten-elementary school with a housing project and a combination business education high school and office building. (H.H.C.)

27. Rotunno, Noredo A, and Stelling, A, Carl, The School Site and Development of School Grounds. New York State Education Department, Albany Division of School Buildings and Grounds, State

University of New York, Albany, New York. 1960, 12 pp.

This bulletin concerns the selection, acquisition, and development of site for school purposes. Ideally, site acquisition is planned for several years advance of need. The site serves several educational uses, the location of a school building, physical education, outdoor instruction and recreation for all ages, space for supplementary services such as bus loading, parking and landscaping, and unforeseen future needs. The concept of the "School-Park" is suggested. Standards for location and selection are suggested which include a complete table of area requirements for games and recreation activities. Many different sources should be explored including forecasts, community master plans, sale surveys, aerial photographs, highway plans, the architect, and state educational and health standards. (D.O.B.)

29. Score Card for School Site. School Building Assistance Commission, Boston, Massachusetts, April 1949, 1 p.

A rating form assisting in the determination of the quality of school site. Items listed include: location, accessibility, size and shape, topography, etc. (H.H.C.)

30. Simonds, John O. School Site Development. A paper read before the meeting of the Task Force on School Construction of the Governor's Committee on Education. Harrisburg, Pennsylvania, May 23, 1960. (Mimeographed)

This is a paper read by a Landscape Architect and Planner before the Governor's Committee on Education. The paper emphasizes the importance of site development to include out-of-door classroom areas. These areas could include specimen trees, a pool or fountain, sculpture, murals, or mosaics or a reforestation program and an arboretum. Numerous ideas and concepts of school site development and planning are presented.

31. Sine, David F., Educational Parks, National Education Association, NEA Journal. March 1968, 3 pp.

The development of educational parks, centralizing school facilities, has resulted in potential advantages and disadvantages, which are described by three educational specialists in terms of elementary education. Advantages include: (1) lower site costs, (2) better racial balance, and (3) greater flexibility. Questions raised concerned community planning, curriculum development, and facility organization. Disadvantages mentioned, are in comparison to neighborhood schools, transportation problems, home and cultural relationships and depersonalization.

32. Smith, Rex M., Handbook on Planning School Facilities. West Virginia State Department of Education, 113 pp.

Prepared for the purpose of supplementing guide for planning school plants published by the National Council on Schoolhouse Construction.

In outline for it contains chapters concerning: (1) the school plant program, (2) school site, (3) the elementary school, (4) the secondary school, (5) school plant safety, (6) service facilities, (7) common environmental factors, and (8) related information. Included are references to pertinent sections of the West Virginia State Code related to school construction, suggestions for architectural contract provisions, project approval forms, and a checklist of school board and school administrator task responsibility areas related to school construction.

33. Smith, R.N., and others (Editors), *School Business, A Manual on School Business for School Officials.* Department of Public Instruction, Des Moines, Iowa. 1965, 84 pp.

A manual designed for Iowa school officials to help them expedite their labors in planning and managing schools. It cites statutes, regulations, practices, attorney general's opinions and reports, and court decisions relative to school business in Iowa. Although the purpose and value of this publication are peculiar to Iowa, school officials in other states might use it in constructing a similar manual of their own. Chapter IX on School Buildings and School Sites and Chapter X on School Insurance should be especially informative to those interested in obtaining school sites, constructing school facilities, and school insurance programs. Included is a 1963 copy of the Standard Form Agreement between Owner and Architect recommended by the American Institute of Architects and used by many school boards. (A.B.G.)

34. Taylor, James L., *School Sites, Selection, Development, and Utilization.* U.S. Department of Health, Education and Welfare. Bulletin #7, Government Printing Office, Washington, D.C.: 1958.

Designed to assist school officials in school site layouts, building locations, landscaping and school site activity areas. Illustrations depict different school site development. Emphasis is given to practical applications of school site development and utilization.

35. The Athletic Institute, *Planning Facilities for Health, Physical Education and Recreation.* Rev. Edition, The Athletic Institute, Inc., Chicago, Illinois: 1956.

A guide to aid school officials in functional planning of facilities for athletics, recreation, and physical and health education programs. The guide is useful in demoting plant specifications and developmental standards related to athletic, recreation, and health equipment.

36. Wakefield, Howard E., *Locating Education Facilities,* An Annotated Reference List. Wisconsin University, November, 1968. 54 pp.

An annotated reference list of documents concerned wholly or partially with school and facilities location and site selection. All levels of education are covered and each document is indexed and abstracted.

37. Wilson, Russell E.; Stapp, William B.; Hendrix, Eunice; Fulton, Douglas, and Johnson, Carl D., Opportunities for Environmental Education on School Sites. The University of Michigan, Ann Arbor: 1971. (Mimeographed)

A co-authored publication for the Ann Arbor Board of Education which reflects the importance of environmental education and the potential role of school sites in contemporary society. A significant contribution of the publication is the presentation of a developmental model of schoolboard-school site policy. Chapters included in the publication are: (1) A Rising Concern-Environmental Quality, (2) The Importance of Environmental Education, (3) A Guideline for School Site Development and Site Selection, (4) Ann Arbor's Resources for Environmental Education, and (5) Acting to Create Better Learning on School Sites. Inclusive in the appendix material are educational specifications for the teaching of earth science on the school site.

Site Resources

III. RESEARCH STUDIES

1. Aimmerman, Mary Ann, Estimation of Parking Demand at a University Campus Serving Commuting Students. Purdue University, Department of Civil Engineering. June 1968, 71 pp.

Procedures are developed for estimating parking demand at university campuses serving commuting students, based on data consisting of a parking space use study, information concerning the number of persons on campus each hour, and enrollment figures. Equations are developed to estimate the parking demand of students. Equations to estimate the peak parking requirement for the staff are also developed. A bibliography is included.

2. A Parks Appraisal . . . Regional Facilities - A Summary Report. Department of Park Administration, School of Agricultural Sciences, Texas Technical College, Lubbock, Texas: 1969.

A follow-up study of The Sociological and Economic Impact of Urban Parks in Dallas, Texas, 1966 was conducted by park administration researchers in Fort Worth, Texas in 1969. The research project measured the social and economic influences of thirteen urban parks as related to adjoining residential neighborhoods. The research report was designed to supply answers to the following three questions which are stated in hypothetical form:

1. The distance that the park effects the property value is approximately equivalent to the service area of the park.
2. In the case of a park which is associated with a school (which typically reduces the value of near or adjacent residential properties), the park may reduce the detrimental effect of the school on surrounding property values.
3. Parks in Fort Worth effect property values in the same manner as do parks in Dallas.

The study accepted the three stated hypotheses and verified the general primary and secondary economic results of the Dallas research. Significantly, the research effort did measure the fiscal implications of three school-park combinations which were included in the thirteen urban parks. Thus, this critique will concentrate upon the general economic and social findings of the three school-park sites.

Economic and Social Impact of School Park Combinations

1. School-park combinations exert positive economic influences upon surrounding residential property values.
2. School-park combinations, aesthetically developed and well designed, will stimulate better quality and maintenance in nearby residences.
3. School-park combinations favorably effect land values when the park is the major portion of the site.

4. In school-park combinations, the park reduces the detrimental effect of the school on surrounding residential property values.

5. The distance of the school-park effects property values is nearly equivalent to the service area of the school-park site.

6. Generally, higher property values are a direct function of the amount of use of the school-park combination.

7. The social attitudes and behavior of residents coincide with the impact factors which the school-park combination has on property values.

8. The social attitudes and behavior of residents are a function of perceived benefits of the school-park combination.

9. Aesthetically developed and well designed school-park combinations were perceived by residents as positive assets of their neighborhoods.

3. Arizona State University, Design for Lifetime Learning in a Dynamic Social Structure, Education 1980 A.D. - A Study of Education Potential in the Litchfield Park Area of Arizona. The State University, Bureau of Educational Research, 1968, 152 pp.

The community school concept is the basis for this design for education in the Litchfield Park area of Arizona. In this concept, the entire community is a laboratory for learning. The community is a place where living and learning converge. Based upon this concept, goals of education and the characteristics of schools and programs to realize the goals are presented. Proposed educational programs covering the areas from early childhood education and adult education are developed, and an organization of the professional staff is suggested. Proposed school district structure, site and facility requirements, and operating and capital costs are set forth. The relationship of the proposed educational programs to other community services are discussed and implementation of the entire study is suggested. A bibliography of books concerning planning for education is included.

4. Ashbee, R. Wayne and Robert L. Fisher, The Marbrook School (An Elementary School Pilot Project of the State of Delaware). Dollar, Bonner, Blake, and Manning Architects. September 1966, 41 pp.

Descriptive material includes curriculum and site considerations, cooperation with state regulatory agencies in area restrictions, work with educational laboratories, architects and teams of consultants, planning phases and techniques. Specific material is given for educational program requirements and environmental factors. Other details included are site considerations, compactness and flexibility, variable pupil grouping, visual control windows, school cost trends, and computer assisted instruction. Plans and specifications for the proposed solution are provided. A typical curriculum schedule is also included.

5. Berkeley Undivided School District, Integrated Quality Education (A Study of Educational Parks and Other Alternatives for Urban Needs), The School District. July 1968, 87 pp.

Racial integration and long-range school planning are the major concepts incorporated in this study. The elimination of de facto segregation by various methods of school and grade reorganization and instructional program planning are discussed as is the concept of two-way busing and the entire problem of pupil transportation as it relates to racial integration of the public schools. The long-range plan calls for a complex of educational parks and a prototype of a middle school, grades 4-8, as part of that complex. The study includes demographic maps, diagrams, photographs in support of the text.

6. Bower, Frank, Two Schools Designed for Common Site, The Nation's Schools, 1050 Merchandise Mart, Chicago, Illinois. July 1957, 6 pp.

This is a case study of the new junior-senior high school in Great Neck, Long Island, which is called by the author an example of a modern American high school. The site is a hilly and heavily wooded area of approximately 115 acres. With two fully-equipped auditoriums, four dining areas, and four gymnasiums, one of which contains a natatorium, the architects believe the Great Neck school provides more special facilities than any comparable school in the country. The school plant is a complex of 13 buildings - six for the junior high and seven for the senior high. The school is wrapped around three sides of a hill with the junior high school facilities on one side, the core dining area in the middle, and the senior high school facilities on the other side - thus two schools on a common site. The initial plant was designed to accommodate 1,400 junior high school students and a senior high school of 1,200. Included in the 115 acres is a nine-acre parcel donated to the school district by the late Henry Phipps along with the Phipps mansion, which is presently serving as the headquarters for the school administration. As much of the grounds as possible was retained in its original state of beauty and 15 acres of the site were set aside for nature study classes. (M.G.C.)

7. California School Building, Bureau of School Planning, California State Department of Education, Sacramento, California. 1966, 151 pp.

Twenty-five new California schools - seven of which are high schools - are described in this publication. The description contains a location map, an exterior photograph, identifying data, a site plan, and a short paragraph about the building. Included are a floor plan, a brief commentary on outstanding features, and two photographs, usually of interiors. (J.H.R.)

8. Caudill, Rowlett and Scott, Architects, Comprehensive Campus Plan, University of Miami, The Architects. April 1967, 47 pp.

A campus plan for the University of Miami is preceded by background information concerning the University and a discussion of the three basic concepts giving major direction to the plan (1) identity, distinguishing the campus from its surroundings, (2) inward growth, concentration of the highest densities of development toward the center of the campus and effecting a transitional zone of lower density around the perimeter, and (3) perimeter parking. The general development plan is presented, giving special attention to components such as the land use plan, the density plan, the electrical plan, etc. Maps and sketches are included. Functions involved in implementation of the campus plan are discussed.

9. Caudill, Rowlett and Scott, Architects, The University of Nebraska - Comprehensive Campus Plan 1967. The Architects. 1967, 127 pp.

A comprehensive campus plan for the University of Nebraska includes background information concerning the University with a discussion of the planning approach and the phases in development of the plan. The city campus plan is based on the concept of a primary pedestrian boulevard, which achieves a unified whole, providing convenient pedestrian routes and continuity in environment. The relationship between the University and the immediate urban area is reviewed giving consideration to problems such as land use and circulation conflicts, and the need for expansion. The east campus plan concept involves development of three concentric rings. Plans concerning land use, circulation and parking, and density are presented including maps and sketches. Implementation and staging of the campus plan are discussed. Detailed information, which was analyzed in formulation of the plans, is presented in the appendices.

10. Chase, William Waymouth, A Study to Determine the Sizes of Sites for Indiana Elementary Schools with One Room per Grade, Two Rooms per Grade, and Three Rooms per Grade. Indiana University, 1956, 145 pp.

This study consists of several sub-problems, as follows: (1) the amount of space required for out-of-door educational and recreational activities which are recommended by educational authorities for the different grade levels, (2) the amount of space which the building occupies and the space allotted for requisite service areas as delivery and service drives, automobile drives, sidewalks and pedestrian approaches, the bus loading area, urban, busloading area, rural, teacher parking areas, community and patron parking area, landscaping for site beautification, and (3) the amount of space required for community activities.

The study presents four basic recommendations: (1) elementary school site requirements in Indiana be restudied in view of the findings, (2) elementary educators study further the possibilities for more complete utilization of elementary school sites, (3) further study be made of the space allocations on existing elementary school sites, and (4) a study similar to the present study be conducted concerning high school sites. The following significant conclusions were abstracted from the study: (1) the elementary educational program is constantly expanding and utilizing more space outside the school building itself, (2) close cooperation between school officials and community planners is essential to avoid duplication of space, equipment, personnel in the planning of the educational and recreational programs of the school and community, (3) the size of the site is dependent upon the activities and a combination of needs of the pupils enrolled in the school, (4) the philosophy of the educational program must be established and plans to implement it must be made before the size of the school site can be adequately determined, (5) findings in this study indicated that free play, gardening, nature study, outdoor class activity, physical education and recreation, and apparatus play are valuable to a good elementary educational program and justify the provision of space on the school site for them, (6) separate areas for the various educational and recreational activities on the school site are essential, (7) the total space requirements for the educational and recreational activities in the elementary school program do not increase proportionately with the increase in enrollment, and (8) the space requirements as developed in this study for elementary schools tend to be less than those recommended by the American Association of School Administrators and the National Council on Schoolhouse Construction. However, these differences become insignificant as the sizes and enrollments of elementary schools increase.

11. Clinchy, Evans and John Beyon, Profiles of Significant Schools: Public School No. 9, Borough of Queens, New York City. Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, New York. September 1960, 20 pp.

This is one of several Profiles of Significant Schools completed by the Educational Facilities Laboratories. Public School No. 9 is one of nine units of the New York school system which rents its space from apartment owners and the New York City Housing Authority. It is the only one that is a separate school; the others are annexed to existing schools. Its significance rests on its being part of a public housing project -- not a building on a separate site as a unit. Its advantages are: (1) being a part of a housing project results in a greater sense of community spirit, (2) there is plenty of play space just outside its doors which serves for both school and neighborhood, (3) the school occupies the ground floor only and can be used for other community purposes, can be converted to school use or to apartments as population changes. Disadvantages are: (1) most rooms are not ideal for school use because they were built for other purposes. Some are small and window space is bad. Too many concrete columns in rooms, (2) separation of units makes administration, communication, and distribution of school supplies difficult. No intercom system.

Would work better if the school had been planned at first as vital part of the housing development. Public School No. 9 is not costly. School-community relationship is good, there are at a minimum, teacher-parent conferences are easily arranged, there are no transportation problems, and school facilities can be used day- and year-round. (A.B.G.)

12. Clinch, Evans, Profiles of Significant Schools: Rich Township High School, Olympia Fields Campus, Rich Township, Illinois. Educational Facilities Laboratories, Inc., 477 Madison Avenue, New York, New York. May 1960, 24 pp.

Report on a school constructed in two sections - the first in 1961 and the second in 1964 - to house an enrollment of 1,500 in grades 9-12. The goal of the planner was to build a school that would provide an efficient and productive education in an adaptable and economical building. The basis philosophy was centered around the team approach to teaching with the staff and program split into four divisions: (1) humanities, (2) health and physical education, (3) science and mathematics, (4) vocational and fine arts. The teams are organized under the leadership of the appropriate division head. Each division is housed in its own separate area and each team shares an interior court and team preparation room. The site contours provide practical arts and activities on the lower level with academic areas on second level. The original unit provides for expansion to accommodate the second section and the total structure consists of a skeleton steel frame wity nonload-bearing walls. Mechanical and ventilating systems are either in the coiling or floors and the modular bays permit enlarging or reducing spaces by moving walls. The commons area envisions multiple use. The building is heated and cooled by means of a water-to-water heat pump and a significant portion of the report discusses relative costs and operation of several heating and cooling systems. (J.H.H.)

13. Culver, Harold Walter, Analysis of a Program of School Site Planning in San Diego, 1953-1962, University of California, Los Angeles. 1965, 376 pp.

The purpose of this study was to determine the advantages of a funded and staffed, comprehensive, long-range program of school site selection, reservation, and acquisition with respect to: (1) securing sites which are adequate in size; (2) securing sites which are centrally located and safely accessible, but adjoining ownerships in a "good neighbor" relationship, and have the desired environmental conditions; (3) having sites available at the time of need; (4) saving money in the cost of land, its acquisition, and its development; and (5) making more effective use of condemnation.

Planned sites were: (1) larger than sites which were partially planned; partially planned sites were larger than unplanned sites; (2) more centrally located and had safer routes of access than partially planned sites; partially planned sites were more centrally located and had safer access routes than unplanned sites; better related to adjoining parks, other school land, churches, and other publicly owned lands than unplanned sites; more likely to have more shared property lines at the same elevation as the adjoining properties and to have more potential "neighbor" problems; (3) available for development and occupancy at the time of need, thereby reducing the need for temporary housing or double session; (4) acquired at major savings in cost of land acqusition and cost of land purchase and development; the early planning also permitted the inclusion or provision of features considered most desirable for school use; (5) acquired as economically and in approximately the same time, without undesirable public relations, through the effective use of eminent domain as through direct negotiation. The amount of benefits and economics available through a funded and staffed, comprehensive, long-range program of school site selection, reservation, and acquisition corresponded to the thoroughness of the planning and the completeness of its implementation.

14. Dunn, William Vincent, A Study of the Size and Utilization of Senior High School Sites. Rutgers - The State University. 1965, 265 pp.

This study seeks to develop more meaningful recommendations for the size of the senior high school sites based on the explanations underlying the minimum recommendations of each state, the experiences of school administrators in utilizing high school sites, and the judgment of experts in the various divisions of the curriculum as to space needs.

This study of the size and utilization of senior high school sites suggests: (1) that the formula type recommendation for minimum senior high school site size based on a basic area plus one acre for each 100 students utilized in thirty-one states, be reconsidered since its application is open to question; (2) that all state agencies consider the preparation of senior high school guide sites based on the total function of the school site: instructional use, auxiliary use, supplemental use and provision for unforeseen need. Such guides should include a check-list of recommended space allocations for the various functions of the site, similar in specification to the guides for classroom space and design, building safety, etc., and be available to local school administrators and other planning high school buildings.

15. Garrigan, Richard, You Can Accurately Predict Land Acquisition Costs. College and University Business, Vol. 43, No. 2, August 1967.

Land acquisition costs were tested for predictability based upon the 1962 assessed valuations of privately held land acquired for campus expansion by the University of Wisconsin from 1963-1965. By correlating the land acquisition costs of 108 properties acquired during the 3-year period with (1) the assessed value of the land, (2) the assessed value of the improvements, (3) the area in square feet, and (4) a time factor related to the months elapsed between January 1, 1963 and the acquisition of the parcel. A correlation coefficient of 0.97 was obtained. Using these developed variables the estimated acquisition costs of 33 parcels subsequently purchased during 1966 varied only 2 per cent from the actual price paid,

$1,033,535 estimated versus $1,012,085 total acquisition cost. The proximity of acquisition to estimated cost may be related to the fact that city appraisors and the appraisers employed by the University use the same valuation methods. The formula developed for estimating land costs is included and explained for computer application.

16. Good, Warren Richard, Procedures and Factors in School Site Selection in Delaware. Temple University. 1964, 270 pp.

A study pertaining to procedures, techniques, factors, and reasons for school site selection in the State of Delaware. The purpose of the study was to: (1) determine the procedures and factors considered by the chief school administrator and the building commission in the choice of a school site or sites, (2) determine to what extent procedures and factors were considered in site selection in a large city area, in rapidly growing suburban areas, and in small town and rural areas, and (3) ascertain to what extent Delaware's social heritage of separation of the races in matters of housing and schooling affected the acquisition and location of school sites.

Data from 129 school sites yielded the following results: (1) pupil population studies were organized and conducted on a voluntary basis by lay personnel in the majority of Delaware school districts engaged in census activities. (2) Diverse procedures pertaining to the enumeration of pre-school children were caused in part by Delaware's failure to carry out the provisions of the State School Code, mandating a biennial census, (3) Following World War II, the majority of Delaware school districts projected school site and building needs from five to ten or more years in advance. (4) School building commissions were increasingly seeking the assistance of lay committees, architects, engineers, and outside professional consultants prior to the selection and purchase of school sites. (5) School officials in suburban districts questioned the efficacy of the zoning code and provisions in the land usage plans for the retention and preservation of desirable school neighborhoods. (6) The right of eminent domain empowering public agencies to initiate condemnation proceedings has not been exercised by Delaware School Boards. (7) School sites were not purchased sufficiently in advance of need. (8) School officials in Delaware have become more scientific in school site selection procedures as indicated by the fact that engineering studies including topographic, contour, and sub-soil evaluation had been initiated prior to selection of sites. (9) City, suburban, and small town or rural districts showed similar concern for location, size, accessibility, availability, topography, cost and utilities as factors affecting final site choice. (10) The city school district seemed to emphasize and give greater consideration in its site selection practices to accessibility of public parks, public transit systems, and political implications. (11) Suburban and rural decision makers weighed heavily the nearness and availability of water lines, interceptor sewers, gas lines and other public utilities, (12) Delaware elementary school sites outside the city of Wilmington had a mean size which more than meets the minimum recommendations of national authorities. (13) The philanthropy of Pierre S. duPont and the formation of the Delaware School Auxiliary Association in 1919 brought about a change in school site selection practices. (14) Negro school building commissions experienced problems in the location of school sites which differed from commissions selecting sites for white schools. (15) An unwillingness on the part of white property owners in Delaware to sell land for Negro school sites has perpetuated Negro schools in so-called sections or communities.

17. Hendon, William S., Kitchen, James W., and Pringle, Bruce: The Sociological and Economic Impact of Urban Parks in Dallas Texas, 1966. Lubbock, Texas: Texas Technical Press, 1967.

The study, conducted by Park Administration faculty of Texas Technical College, measured the social and economic influences of thirteen urban parks as related to adjoining residential neighborhoods. The economic portion of the study was designed to measure the following hypotheses:

1. The distance that the part affects the property value is approximately equivalent to the service area of the park.
2. In the case of a park which is associated with a school (which typically reduces the value of near or adjacent residential properties), the park may reduce the detrimental effect of the school on surrounding property values.

The research study accepted the two hypotheses and presented additional fiscal implications in the form of primary and secondary economic benefits. The data pertaining to the sociological impact of urban parks was considered inclusive by the investigators; thus, this critique will focus upon the economic costs and benefits of the urban parks.

Economic Impact: Analysis of Primary Benefits

Primary economic benefits are based upon the actual use of the park site. The study reflected the following general conclusions as related to primary benefits:

1. Playground parks were generally economic assets to the community.
2. Relative to cost factors, large playfields were generally marginal in economic benefits.
3. Failure to generate significant benefits were attributable to two principal causes; (a) high capital cost among the playfields, and (b) limited access to the parks.

4. Large parks are economic liabilities for a community unless their use by adults is increased.

5. Increased use of automobiles will reduce the net benefits of small parks for neighborhood users.

6. The ideal size of the park, playground, or neighborhood park should range between 10 and 15 acres. The community play-field should average between 12 and 15 acres.

7. Expansion of activities for adults, improved maintenance, increased shade, and well-trained supervisory personnel are positive factors for increasing park use.

Economic Impact: Analysis of Secondary Benefits

Secondary economic benefits are direct fiscal implications of urban parks upon the surrounding residential neighborhoods. The study recorded the following general conclusions as associated with secondary benefits:

1. Normally, parks exert either a positive or negative effect upon the property values of parcels close to the park.

2. The positive effect appears to be from 5 to 20 per cent higher; properties within 500 feet of the park are proportionally higher in value than properties over 500 feet from the park.

3. The negative effect appears to range from 10 to 20 per cent; properties within 500 feet are proportionally lower in value than properties over 500 feet from the park.

4. Positive and negative effects are reflected in surrounding land values.

5. Positive and negative effects are seen in the value of improvements to the sites. Aesthetically pleasing and well designed parks stimulate better quality and maintenance of housing units close to the parks. If the park is not well maintained, property values adjoining the park will depreciate.

6. The distance the park effects the property value is equivalent to the service area of the park, except in the case of large parks.

7. Redevelopment of the park, planting of trees, shrubbery, general landscaping, will increase development of the neighborhood assuming that the neighborhood is not in a blighted condition.

8. The time of development and acquisition are significant to the impact of the park upon surrounding subsequent property values. Accordingly:

   The acquisition of land, the development of land, and the completion of the park, are all interrelated with the time of development of the neighborhood.

   Therefore, the development of a park prior to the final development of the neighborhood would have the greatest subsequent positive impact upon property values.

   Also, the development of a park in an existing neighborhood will have a lesser impact on property values.

   From a property value standpoint, the park should be developed immediately after the development is initiated. The extent of this development is conditioned by the expected use of the park. Therefore, the park design should attempt to balance the use and property impact. This can be accomplished by the timing of and the development relative to the neighborhood development.

9. The impact of land values is relatively more significant as compared to the impact of the total value of properties.

10. The impact of the park on property values is greatest in residential areas.

11. The relative impact of the park on property values is different among various economic groups; thus, the impact appears to be greatest among high valued residential properties and lower as property is of lesser value.

12. The economic influence of a park upon commercial property is presently not known.

13. The economic influence of a given park effects the total property of a city in a negligible way.

14. Parks can have a stabilizing influence on property values, thereby creating a type of stabilizing force for prices of real estate in the area.

15. A well-integrated school-park combination will generate the most significant economic impact upon surrounding property values, both in total assessed value and land value correlations.

18. Horowitz, Harold, The Architects Programme and the Behavioral Sciences. National Science Foundation, ARCHITECTURAL SCIENCE REVIEW, September, 1966.

Problems and areas in the architectural program, and relation of these to the capabilities of the behavioral sciences. The discussion indicates the role of the program in the design process, including the different classes of information: (1) objectives of the master plan, (2) special restrictions and limitations on design, (3) characteristics of the site, (4) site development requirements, (5) functional requirements of the facility, (6) characteristics of the occupants, (7) specific facility requirements, (8) relative location and interrelationship of space, (9) budget, (10) flexibility for future growth and changes in function, and (11) priority of need among the various requirements. These areas include common interests between architects and behavioral scientists with particular contributions from: (1) objective interviewing, (2) improvement of planning criteria through better sampling and information-gathering techniques, (3) techniques for organizing information for optimal use in decision making, including contextural maps, and (4) understanding of role relationships in programming activities. Examples include science and university facilities design. Suggestions are given for further research.

19. Kilian, Otto H., Long Range Development Plan for Honolulu Community College. Charles Luckman Associates. June 1967, 63 pp.

Describes briefly a wide range of topics as follows: (1) site conditions - vicinity map, physical characteristics, zoning and land use, assessed valuations, traffic analysis, (2) existing campus - type, age, and condition of inventory, and (3) new campus plan - facilities groupings, future growth, vehicular circulation, service traffic, pedestrian circulation patterns, and landscaping. Each topic is illustrated by an accompanying diagram, aerial photograph, model, or floor plan.

20. Lauda, Billy George, Utilization of Secondary School Sites in Fulfilling the Objectives of Teaching Art, Mathematics, and Science in Pennsylvania. University of Pittsburg. 1963, 210 pp.

This study proposes to determine to what extent the school site is utilized in realizing the objectives of teaching art, science, and mathematics. It further proposes to determine how the site may be more effectively used in fulfilling the objectives and enrich the program.

The findings of this study tend to support certain generalizations and conclusions regarding the utilization of senior high school sites for instructional purposes in art, mathematics and science: (1) There is a strong indication that the school site can be used as a valuable adjunct to the classroom and can be used to provide rich and varied educational experience for students, (2) art teachers make more extensive use of the site for instructional purposes than do teachers of mathematics and science, (3) mathematics teachers do not make as much use of the school site for instructional purposes, (4) biology teachers make more use of the site for instructional purposes than other teachers in the science field, (5) the present modest extent of site usage would appear to justify acceptance of the major hypotheses: that standards for school site size have steadily been increasing over the past fifty years, however, current teacher use of the site does not reflect the higher standards for site size recommended by the Department of Public Instruction, (6) there would appear to be sufficient justification for a confirmation of the minor hypotheses that larger school sites make improved curriculum practices possible and that reasons for not using the site can be documented. Large school sites provide teachers with the opportunity to conduct field work and real-to-life experiences in the conduct of their course work in art, mathematics, and science, and (7) numerous reasons were found which restrict use of the site for instructional purposes. As roadblocks to fuller site utilization are removed, more use may be made of the site for instructional activities.

21. Learn, Elmer W., Planning and Acquisitions Problems for a Growing University. Midwest Business Administration Association. April 1968, 10 pp.

Tentative conclusions based on an urban university community planning program and dealing with the characteristics of university communities. Special problems engendered by these characteristics and methods to combat these problems are presented. The problems disucssed center around planning, land acquisition, zoning, and community relations.

22. Mayer, Frederick W., Contrasting Concepts in Campus Planning. Society for College and University Planning, Selected Papers from the First Annual Conference, August 13-14, 1966, 80 pp.

The papers summarized in this document were given at a S.C.U.P. conference and were based upon experiences at colleges in Santa Cruz, California, Chicago, Illinois, and Portland, Oregon. Central to all the concepts of planning was the location of the institution, with the ensuing geopolitical restrictions. Other planning considerations varied in each paper and included the educational program, political considerations, legal restrictions and urban demands. The merits of a static educational program as opposed to a hierarchial allocation of activities and suitability, and as opposed to flexibility, were argued. The desirability of locating campuses in urban areas was also discussed. Representative site plans were included in the text.

23. McGuffey, W.C., et al, Long Range Planning for Seattle Community College. The Associated Consultants in Education, Inc., Tallahassee, Florida. 1966, 192 pp.

This document projects a long-range plan for the overall development of Seattle's Community College program. The principal emphasis is the analysis of data and information pertinent to the determination of potential enrollments, the evaluation of existing facilities, the selection of needed sites for the college, and the projection of general facility requirements and their estimated costs. As the analysis of pertinent information is developed, enrollment projection techniques are explained, site selection criteria are outlined, techniques for program analysis are discussed and space projections are made. The results are specific recommendations for the physical development of Seattle's Community College System for a ten-year period. (C.W.M.)

24. Miles, Jack, School Site Selection and Acquisition in California. University of Southern California 1965, 248 pp.

The purpose of this study was to determine important considerations and desirable procedures in the selection and acquisition of public school sites. Current practices employed in California school district were investigated, and methods used by other public agencies as well as private enterprises to acquire land were examined.

Study of the findings of this research led to the following conclusions: (1) Many factors are involved in each instance of school site selection and acquisition, no two sets of which are ever exactly the same, (2) there is need for more advanced planning for, and early purchase of, school sites in California public school districts, (3) the school Planning Office of the State Department of Education, local planning agencies, land consultants, architects, title companies, and county counsels can provide helpful services in the process of school site selection and acquisition, (4) in the majority of instances, negotiation is the most satisfactory method of acquiring school sites, (5) there has been a trend toward larger school sites during the past twenty-five years, (6) there is need for more adequate means of ascertaining the qualifications of appraisers, (7) there is usually no necessity for school districts to accept reversionary clauses in deeds, (8) the initial cost of a site is sometimes only a fraction of the total site development and improvement cost. Failure to investigate possible expenses in connection with the development of the site can create serious financial difficulties, and (9) county agencies which specialize in the acquisition of real property and have readily available all required services in connection therewith can do much to save school districts valuable time and funds.

25. Mogi, Hitoshi, Kauai Community College Site Selection Report. University of Hawaii, Community College System. May 1966, 37 pp.

To aid in the selection of a more suitable site for the Kauai Community College; fourteen sites fulfilled the general size, environment, and adaptability requirements. The screening criteria applied to these sites were accessibility, environment, and economy in development. The advantages of the selected site are given along with aerial photos and enrollment projections. Particular attention is given to site selection data regarding proximity to population, site development costs, and facilities expansion potential.

26. Moore, Frank C., Economy Handbook - Economics from A to Z in Planning and Building Schools. Commission on School Buildings, New York State, November 1960, 107 pp.

A report of a study by the Tempory State Commission on School Buildings of the New York State Legislature. Includes recommendations for effecting economics in five categories: (1) Selecting the Architect, (2) Site Selection, (3) Educational and Architectural Planning, (4) Construction Details, and (5) Contracting Work. Each category has subdivisions which are provided with checklists of suggestions appropriate to the activity or function under consideration. Photographs, diagrams, and floor plans are provided as explanatory material. Appendix I supplied an additional checklist for Heating and Ventilating and for Plumbing economics. Appendix II provides an additional checklist of economics which may be effected through deletions and postponements. No information is furnished regarding study design or data collection methods. (C.B.)

27. New York State University Construction Fund, Development of Site Programs and Budgets and a Procedure for Establishing Quality Levels and the Control of Site Costs at the Campuses of the State University of New York. State University Construction Fund, January 1966, 67 pp.

A comprehensive campus plan developed by the New York State University Construction Fund with the aid of site consultants. The purpose of the plan is to provide a general site program upon which realistic site cost estimates and action programs for scheduling each project can be based. The comprehensive planning stage includes guides, comprehensive campus planning, and research and development. The site program stage includes the program, preparation, tabulation, and review of the site program. The site work cost estimate stage focuses on unit prices, design elements, budget testing and evaluation of testing method. The summary stage discusses review and approval procedures. The appendices include graphics and forms to complement each stage of the procedure plan.

28. New York, Syracuse City School District, The Campus Plan (One Answer to Quality Elementary Education in Syracuse), The School District, 1968, 17 pp.

One of three research reports published on the campus plan for Syracuse Elementary schools. This report, after explaining the plan and the advantages to be realized from it, is concerned with how much the plan would cost. A schedule of capital outlays for various alternate plants, for both the campus plan and scattered-site schools with various facility arrangements, is presented.

29. Pennsylvania University, University of Pennsylvania Campus Development Plan (3rd Edition). Pennsylvania University, University Planning Office, April 1966, 47 pp.

Based upon enrollment, building area, and parking area projections, the development plan describes areas of development parking and housing, administration, athletics, academic departments, libraries, museums, related community and commercial services, transportation, land acquisition, and the neighborhood. Detailed sketches illustrate these areas.

30. Perkins, Neal Baker, The Development of Criteria and Score Card for Use in Selecting Locations for Area Vocational-Technical Schools. Pennsylvania State University, University Park, Pennsylvania. September 1962, 167 pp. University Microfilms 62-4104.

In this study the attendance area scorecard yielded discriminative scores when applied to eight satisfactory and eight unsatisfactory attendance areas. The difference between the mean score for satisfactory attendance areas and the mean score for unsatisfactory attendance areas was found to have statistical significance at the .001 level of confidence. The site selection scorecard when applied to eight satisfactory and eight unsatisfactory area vocational-technical school sites, also yielded discriminative scores. The difference between the mean score for satisfactory sites and the mean score for unsatisfactory sites was found to have statistical significance at the .001 level of confidence. Based upon a comparison of paired scores recorded for each of the attendance areas used for the study, a .9920 Pearson product-moment coefficient of correlation resulted. When paired scores obtained for each of the sites used for the study were compared, a .9375 coefficient of correlation was obtained. The consistency with which each of the two scorecards produced similar scores for repeated applications was found to have statistical significance greater than that required at the .01 level of confidence. The results obtained from conducting this study serve as a valid and reliable instrument. It was also found that the ten items appearing on the site selection scorecard would serve appropriately as criteria for the selection of locations for area vocational-technical schools. (T.E.J.)

31. Planning a Comprehensive Education Plaza and Supplementary Services Center. Title II-Elementary and Secondary Education Act of 1965 - Supplementary Centers and Services Program, Sault Ste. Marie Area Public Schools, Sault Ste. Marie, Michigan, June 30, 1968, 272 pp.

The Sault Ste. Marie Educational Plaza, a Title II Project, combines the educational and social resources of a community on a geographically situated site. The report includes a discussion of: (1) historical background of the area, (2) plaza master plan, (3) programs related to biology-ecology, fine arts, recreation, and adult and vocational education, (4) health and social service programs and facilities, and (5) the dissemination of information to the community.

32. Reida, G.W., School Sites: Selection and Development. Kansas State Department of Public Instruction, Topeka, Kansas. 1966, 25 pp.

Certain critical criteria should be considered in selecting the school site. Important is the study of such factors as present and projected pupil populations, the school master plan, main thoroughfares, dwellings, land use, soils (shown by service maps), existing school facilities and attendance boundaries, utility services and flood controls. Preparing the site for building construction is dependent on district administrative organization, i.e. elementary, senior high school or other, ultimate school enrollment, the school's educational program, expenditures for excavation and for operation and maintenance of the plant, convenience and safety factors, and general areas to implement the school program. The site should be located in a proper relationship to community facilities and be easily accessible to both pupils and patrons. To deter additional costs, land contours, subsoil composition, availability of land, disposition of structures on the land, legal measures to acquire the land, physical hazards and possible annoyances should be carefully examined. The size of the site may be determined by the present and future needs of the whole school program. Areas within the site should be allocated for the school building, building expansion, parking lots and driveways, paved game areas, physical education, outdoor instruction, a stadium with parking facilities, landscaping and buffer areas, and unassigned areas to be held for future use. (G.M.)

33. Rich, Richard C., Colleges Build Up and Down in Search for Parking Space. COLLEGE AND UNIVERSITY BUSINESS, Volume 44, No. 6, June 1968.

On parking problems. Information collected by questionnaire from 27 colleges. Sample responses from the institutions are cited to illustrate the varied aspects of the problem. For example, the University of Akron has 8,000 students of which only 10 per cent live on campus; the University of Michigan is completely surrounded by the city of Ann Arbor so that new space for parking is unavailable; Wayne State University At Detroit banks the profit from fees and fines to provide for future parking facilities; some multilevel parking facilities are located above and/or below ground level with multistory academic housing; and service facilities built above. The pressures for parking facilities are greatest on the urban campuses. A tabular summary of the data collected is included.

34. Rogers, Paul Jesse, Development and Utilization of Elementary School Sites. University of Southern California, Los Angeles, California. 1964.

Interview investigation. Recommendations included: (1) site acreage should be based on the type of site and use; (2) a master plan for ultimate development should be established; and (3) the individuals who are to use the school plant should help to plan it. (P.J.O.)

35. Saginaw Township: Saginaw, Michigan School Site Study. Caudill,

Rowlett, and Scott, Architects, 3636 Richmond Avenue, Houston, Texas. August 1959, 55 pp.

A study reviewing the problems of determining the need for future school sites according to projected enrollments through 1980. Survey study attempts to determine the following factors: (1) number of students presently enrolled; (2) how students are grouped within residential areas; and (3) how students are grouped within schools. Total population trends, school census, public school enrollment, and grouping number are charted. (H.H.C.)

36. Schneider, Raymond Clinton, Factors Affecting School Sites. Stanford University. 1955, 328 pp.

The purpose of this study was to identify, analyze, and relate various factors affecting school sites. The twenty-five factors affecting school sites which were identified in this study are: (1) Availability, (2) location, (3) environment, (4) accessibility, (5) size, (6) shape, (7) topography, (8) acquisition, (9) cost of land, (10) soil condition, (11) sub-surface condition, (12) site preparation, (13) orientation, (14) expansibility, (15) flexibility, (16) educational adaptability, (17) site development, (18) utilities, (19) public services, (20) community use, (21) outdoor activities desired, (22) undesirable elements identified, (23) maintenance implications, (24) political implications, (25) master plan. The twenty-five primary factors are further divided into identifiable secondary factors, which are of equal importance to complete an analysis of a given school site. They provide, in addition, an understanding of the types of data needed in the identification, selection, and acquisition of a school site.

37. Schneider, Raymond C. and Wilsey, Carl E., School Site Selection - A Guide. School Planning Laboratory Research, School of Education, Stanford University, Stanford, California. September 1961, 43 pp.

Presents the results of a study to identify factors affecting school sites for the purpose of aiding school administrators, boards of education, architects, engineers, planners, and educational facilities specialists in the formulation of a technique for identifying, analyzing, and rating the various factors affecting school sites. Twenty-five primary factors affecting school sites are identified and include: availability, location, environment, size, shape, topography, acquisition, cost of land, soil condition, etc. Within each of the primary factors certain secondary factors are discussed. (H.H.C.)

38. School Site Analysis and Development. California State Department of Education, Sacramento, California. 1966, 53 pp.

The study represents a search for a system determining the amount of land required to conduct the educational programs offered by the California Public Schools. Data is contained in tables that provide a basis of determining the site size for a school that is being designed to serve a specific enrollment size and grade level range. The site factors included: (1) land for outdoor physical education, (2) developed building site, (3) parking and access roads, and (4) percent factor for layout. Site requirement categories included: (1) small schools (fewer than 7 classrooms), (2) elementary grades, (3) grades 7 through 9, and (4) grades 9 through 12. Supporting this data are diagrams of space modules representing the various facility layouts. Module combination depends on the various enrollment sizes given. To facilitate this analysis, a brief sequential site plan development procedure and list of essential site survey data are included. (M.H.)

39. School Site Standards and Site Selection. State University of New York, Albany, New York. Report Number 1266-N 64-4000 (50057). New York State Education Department, Albany, New York. 6 pp.

This report presents elementary and secondary school site development data compiled by the Division of Educational Facilities Planning, New York State Education Department. Enrollment figures used represent the ultimate size of the schools. The standards are minimum for the State of New York with elementary school sites based on three acres plus one acre for each 100 pupils enrolled with a minimum of five acres and 600 students being the maximum size. The 7-12 and K-12 are based on ten acres plus one acre for each 100 pupils. Included in the study is a graph showing the ratio of enrollment to useable acres and a matrix for such site selection factors as size and location, shape and contour, elevation and hazards, safety and health, purchase price and development costs. (G.M.)

40. Schroder, Lawrence Druce, Utilization of Elementary Sites in the Salt Lake City Elementary Schools. University of Utah, Salt Lake City, Utah. November 1961, 263 pp. University of Microfilms #61-3351.

According to this study the peak free-play use of school grounds occurred during mild, clear weather. When the five spring and five fall lunch-time observations at each of the spacious-site schools were averaged, they resulted in an adjusted range from 285 to 303 square feet per pupil, with a median of 295. The four spring and four fall lunch-time observations at the most crowded sites showed them to be saturated - their largest comparable figure being 185 square feet per pupil. The validity of these results was verified by standard statistical procedures. The physical education program was found to require a minimum of approximately 3.25 acres, depending on the site, for one complete pattern of space and equipment. Using the figure of 295 square feet of free-play per pupil, this was essentially the same as the playground requirements for a school of 460 pupils having half-day kindergartens. Using all seven periods of the day for physical education made it easily possible to accommodate the program in this space. Because of the weather, lawn areas were useable for regular play on less than one-half of the school days, but blacktop was useable almost every day. An essentially level elementary school site of the reasonable regular shapes and proportions possible on city blocks, required approximately seven acres of space to accommodate a 460 pupil, 14-classroom, one-story, elementary school with adequate supporting rooms, and with enough ground to expand to a 700-pupil, 21 classroom, one-story situation with apparently adequate playgrounds containing approximately five acres. (T.E.J.)

41. Schultze, Robert Raabe, The Utilization of Building Sites of the Elementary Schools of the Omaha Public Schools. University of Nebraska Teachers College, 1966. 94 pp.

A study to determine present and past practices of elementary school site utilization in the Omaha School District and to evaluate the present practices in terms of accepted practice and trends.

The recommendations for future planning of the Omaha Public Schools were: (1) Total site size: An elementary school site should include ten acres plus an additional acre for each 100 pupils. (2) Playground: Elementary school sites must provide adequate, well-planned space for physical education and community recreational use. (3) Parking: The parking area should be paved or covered with an asphalt material. (4) Service facilities: Provision should be made so that these facilities can be planned for taking into consideration convenience of use and the safety of the children. (5) Sidewalks and landscape: The careful planning of walks and attractive, functional landscaping is necessary for the best utilization of a school site. (6) Other uses: Upon construction of a new building on a new site consideration should be given to leaving an area in its natural state. On large sites provision for a camping area should also be considered. Every consideration should be given to the fact that the school grounds belong to the public and should be planned so that they can be used by the community after school hours and on weekends for recreational purposes.

42. Shilowitz, Stephen, Economic Evaluation of a Combined School, Apartment Building, and Medical Center. Building Research Institute, 1725 DeSales Street N.W., Washington, D.C. 1962, 5 pp.

The City and Country School in New York City is engaged in a building program which centers about the most complete development of its site possible, in order to obtain income. The site is an 18,000 square foot lot in downtown New York City. After a thorough analysis of zoning laws and community needs, the decision was made to erect a combination school, apartment building, and medical center. Detials of the planning are given, and the project's financial feasibility is assessed. (H.H.C.)

43. Smith, Stanley M., Long Range Development Plan for Leeward Oahu Community College Oahu, State of Hawaii. Daniel, Mann, Johnson, and Mendenhall. April 1966, 73 pp.

Numerous graphics are used to illustrate the areas and stages of development of Hawaii's first completely new community college.

The unique features of topology and climate are emphasized and integrated into the development of the plan. Specific topics discussed or illustrated include; (1) population distribution, (2) land use, (3) parking and traffic, (4) mechanical, (5) electrical services. This long-range development plan for the Leeward Oahu Community college represents a first step in creation of community colleges for the University of Hawaii.

44. Srivastava, R.C., School Sites and Spaces in High Density Habitations. Central Building Research Institute, Roorkee, India. October 1968, 4 pp.

A scientific study for determining the school site and space requirements for varying population densities is needed for effective planning. The properly equipped school site should provide enough space to aid in the mental and physical development of every child. Site determinants include: (1) the school population, (2) allowable enrollment per school, (3) the number of schools required in the neighborhood, (4) planned population densities for new neighborhood areas, and (5) distance from home to school. A table of desirable distances between home and school in five different countries and a table of school site standards in four different countries are given. Building requirements are discussed in the context of open space, and large site area versus the multi-storied structure. Space needs are likewise discussed as they relate to extracurricular activities. The site requirements which are arrived at should be examined for their use efficiency. A bibliography of international sources is included.

45. Stanley, Robert Bruce, Perceptions of Secondary School Site Characteristics. University of Iowa, 1967, 135 pp.

The problem of this study was: What is the difference in perception between superintendents and high school principals in relative importance of selected site characteristics? The study was structured to determine the variability to an order of preference for 10 site characteristics perceived by Iowa school administrators grouped according to several factors. The results of the study indicated: (1) Matched pairs of administrators, the district superintendent and senior high school principal, showed a significantly larger percentage of pairs disagreed than agreed. (2) Substantial amount of disagreement was evidenced in the order of preference listed by all administrative respondents to the site characteristics. (3) None of the factors used for grouping administrators in this study resulted in significant differences in per cent of agreement. (4) Administrators were influenced in perception of site characteristics by other factors which were unique to administrative positions in the respective districts. Therefore, these findings would support the conclusion that school administrators developed an order of preference based on factors related to the local school environment.

46. Tankard, George Granville Jr., Site Requirements for Outdoor Instruction for Virginia Elementary Schools. George Peabody

College for Teachers, 1956, 219 pp.

The study proposes to establish site size requirements for elementary schools in the state of Virginia. The conclusions drawn therein are based upon the premise that the school site should be planned in terms of the educational program it is to support. The amount of outdoor space needed by Virginia's elementary schools has been established, therefore, in three successive steps: (1) Identification of outdoor activities through which the established objectives of the elementary school may be achieved; (2) grouping of these activities into desirable elementary programs; and (3) determination of the space needed to support such programs in elementary schools of various enrollments.

Significant conclusions of the study are: (1) Each of the educational objectives of Virginia's elementary schools may be achieved through any of a number of activities; and, conversely, a single activity usually contributes to more than one objectives. Elementary school programs should consist of coordinations of activities that will provide a number of opportunities for the achievement of each of the desired objectives; (2) although physical education activities comprise a large portion of the outdoor program, an acceptable program includes activities in all subject matter areas; (3) when planned intelligently and carefully, an exceptional program requires only slightly more space than a minimum one. Therefore, generally speaking, the exceptional program requirements should serve as the basis for school site planning; (4) additional area is not always needed in direct proportion to increases in enrollment; (5) the outdoor programs in Virginia's elementary schools are inadequate for three reasons: (a) insufficient space; (b) inadequate facilities, even though area is available, and (c) failure of school faculties to conduct a desirable program despite adequate facilities. More appropriation of school funds does not guarantee an acceptable outdoor program. (6) There is an evident need for close cooperation and joint effort among all national, regional, state, and local groups concerned with planning and providing school sites. Changing concepts of the elementary school in Virginia may negate the specific recommendations for site sizes established in this study.

47. The Five-Year Building and Future Sites Commission, *A School Building and Future Sites Program 1966-1970*. Board of School Directors, Milwaukee, Wisconsin. January 1965, 112 pp.

A list of the school building needs of a large city school system for the years 1966-1970 along with supporting population and enrollment data. The cost of the proposed program is $45,745,000. Special attention is given to educational policies and how they affect the school building program. Attention is given to the "continued conversion of the Milwaukee Public Schools to the 6-3-3-Plan." A report on the program of elementary school modernization carried on by the Milwaukee Public Schools is included along with a proposal for extending the program to the secondary school plant. The report also deals with school building needs in an undeveloped 16-square mile area recently annexed to the city. (E.J.M.)

48. The Wrightman Elementary School. The Research Council of the Great Cities Program for School Improvement, 5400 North St. Louis Avenue, Chicago, Illinois. 1967, 48 pp.

The results of a study conducted by the Pittsburgh Public Schools and the Department of Architecture at Carnegie Institute of Technology to consider schools which are becoming educationally obselete. Should these schools be drastically modernized or should they be torn down. Five things had to be considered in seeking the answers in the case of the Wrightman School: (1) site, (2) educational specification, (3) school district policy, and (4) the existing facility. The suggested solutions and layouts of ten architectural students are presented. (P.J.O.)

49. Turner, Rufus Benton, Utilization of Large Rural and Suburban Secondary School Sites by School and Community Groups in North Carolina. Duke University. 1965, 182 pp.

The purposes of this study were to: (1) determine outdoor instuctional and recreational uses being made of large rural and suburban secondary school sites in North Carolina, (2) ascertain reasons that teachers and principals give for not using school sites more extensively for school and community instructional and recreational purposes, and (3) to develop suggestions for the increased use of large rural and suburban secondary school sites in North Carolina.

The study reflected the following conclusions: (1) The school sites could be used more extensively insofar as available space is concerned; (2) teacher preference for indoor teaching and possible lack of sufficient professional preparation in the use of outdoor resources of school sites are important reasons for these teachers not using school sites more extensively; (3) teachers now using sites might be somewhat more likely to use the sites more extensively than they reported using them if the changes and improvements they suggested were made; (4) the usage of school sites by community groups as reflected in this study does not support the need for larger school sites; (5) additional financial aid for the development and maintenance of instructional areas is needed; (6) additional educational preparation might make teachers and administrators more knowledgeable regarding the general applicability of the school site to instructional and recreational programs; (7) additional personnel for supervisory, maintenance, and janitorial services, especially in connection with the community use of school facilities, is needed; and (8) the acquisition of large rural and suburban school sites in North Carolina, to be justified, must be supported on some other basis than instructional and recreational usage by school and community groups.

50. Weiss, Irving Joseph, Enriching Science Through Outdoor Education. A Resource Guide for Teaching the Use of the Park in the Elementary Schools. (Part I: The Investigation. Part II: The Resource Guide). New York University. 1961, 185 pp.

The purpose of this investigation was to develop a resource guide for elementary school teachers who wish to utilize New York City park facilities for the enrichment of science instruction in grades K-6. Five specific problems were developed: (1) the values inherent in a science program as taught in the out-of-doors, (2) the resources available in the city parks, (3) a list of basic concepts and understandings in science, (4) administrative procedures for field trips, and (5) a resource guide for utilizing the out-of-doors. Chapter V, A Challenge to the Park Department, offers suggestion for an integrated program of the Park Department, school, home and community for the conservation of park resources.

51. White, Robert F., Effects of Landscape Development on the Natural Ventilation of Buildings and Their Adjacent Areas. Texas A & M College System, College Station, Texas. 1954, 16 pp.

Part of a comprehensive study on how to make the best use of natural light and air in the design of buildings and adjacent areas. Previous studies dealt with the distribution of natural light and the pattern of natural air movement throughout the interior. Models were used to represent buildings, hedges, shrubs, and trees at varying heights and distances from the building. While no specific conclusions were drawn, some considerable evidence was produced to show that: (1) Planting can materially affect the movement of air through and about buildings, (2) depending on the way it is used, planting may either augment or reduce the natural flow of air through a building, (3) planting may cause actual change of direction of air flow within a building, (4) planting on the lee side of buildings has little or no effect on the movement of air through the building unless it is in such a position that it obstructs the outlet openings. The investigation described in the report serves to emphasize the importance of landscape design as a science. (J.H.H.)

52. Wilsey, Carl E., School Site Costs in a Rapidly Expanding Surburban Area. Stanford University, Stanford, California. November 1960, 107 pp.

Purposes of study: (1) to test the hypothesis that cost savings result from early acquisition of school sites, (2) to estimate the dollar savings that may result from early acquisition, and (3) to determine how far in advance of need sites should be purchased by the districts included in the survey, at a total cost of $10,883,292. The estimated average cost of sites increased from $3,934 per acre in 1949 to $10,804 per acre in 1959. A positive correlation was found to exist between site costs and population growth, and between site costs and the development characteristics of the land. A low, negative correlation was found to exist between site costs and the number of years in advance of need that sites were purchased. It would seem advisable for districts to borrow money to finance the early purchase of sites, since the initial savings in land cost exceeds the interest cost and tax loss. (T.E.J.)

53. Wilson, Russell E. and June S. Wilson, School Site Development, Title III Project. Croton-on-Hudson, New York. August 1968.

This manuscript is a significant contribution to the field of environmental education and school site development. The report includes a discussion of: (1) the values of "green islands," (2) the "stewardship" of land, (3) purposes for action on school sites, (4) new concepts and principles of sites, (5) financial resources and implications of school site development, (6) citations of Michigan school site projects, and (7) a process for focusing on community centered problems. The appendices include educational specifications for subject areas applied to school sites and a discussion of the social values associated with land.

54. Zufelt, David L., The Influence of Demographic Characteristics Upon Educational Site Selection and Program Development in A Geographic Area. University of Nebraska Teachers College. 1967, 76 pp.

A study concerned with the construction of a model in principle to serve as a tool of analysis for determining educational site selection and its effect upon the articulation of the total program within a given area and/or school district.

The conclusions from the investigation of educational site selection and program development in a geographic area were: (1) The state of Nebraska continues to cope with the problems of population scatter on two fronts, namely an outmigration of residents to other states, and an intra-state migration from the north and south peripheral counties to those counties along major east-west transit arteries having more promising economic opportunities in dominant towns, cities, or metropolitan areas; (2) Professionally a total articulated program for youth in sparsely settled and densely settled areas continues to be an issue which professional administrators and lay board members continue to seek solution. (3) Professional educational planners have devised orderly systems for utilizing maps, for the purpose of analysis in school building site selection, however, the geographic point of view has not been extended to its application in determining educational site selection and program development in a geographic area; (4) Educational site selection and program development in a geographic area is not consistently the result of a systematic study. Systematic study is characteristic of urban and suburban school districts; (5) A systematic and ongoing approach to education site selection and program development in a geographic area, regardless of size, are fundamental to efficient administration and the maximum utilization of physical facilities and personnel; (6) The model construct assists the analyst to better understand the interrelatedness of problematic factors and serves to provide empathetic insight into decision making.